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ze-Reduction Report

DECEMBER 1954

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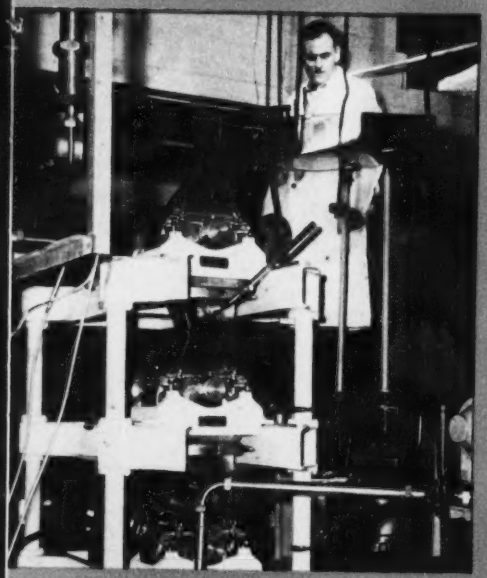
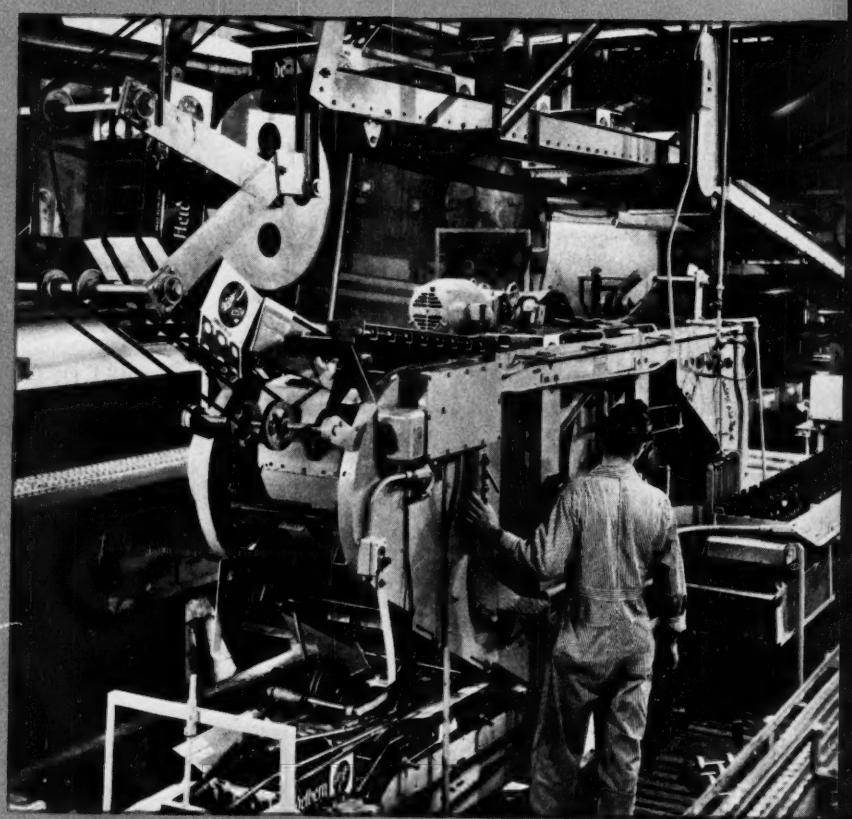
FOOD ENGINEERING

A McGRAW-HILL PUBLICATION



PROCESSING • Size reducers like this make new processes possible. p. 73

INSTRUMENTS • Remote operation recorder cuts plant down-time 10%. p. 64



MATERIALS HANDLING • Machine uncases bottles at 1,000 a min., slashes breakage, and saves much work. p. 69

ALSO: INGREDIENTS • PERSONNEL • MAINTENANCE QUALITY CONTROL • ENGINEERING • TRANSPORTATION PACKAGING • SANITATION • PRODUCTS

. . . See Contents Classified by Subject, Page 3 ➡

INQUIRY COUPON INSIDE BACK COVER

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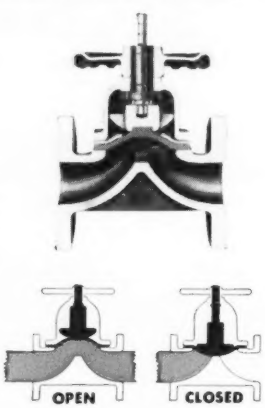
In hundreds of installations, the maintenance-saving design of Grinnell-Saunders Diaphragm Valves has accounted for important economies of labor and money. The only part that will in time need replacement is the diaphragm, and depending on the type of service, it may last for years. To replace it takes only a few minutes. You merely remove the four bolts holding the bonnet, leaving the body in the pipe line . . remove the worn diaphragm, insert the new diaphragm . . replace the bonnet and bolt it down. No refacing or reseating required . . no packing glands to demand attention.

Originally perfected for air and water service, Grinnell-Saunders Diaphragm Valves are now widely specified for many other applications. They greatly reduce replacement and maintenance expenses, especially in lines where corrosion, abrasion, contamination, clogging and leakage can be costly factors. Write today for the Grinnell-Saunders Diaphragm Valve Catalog . . and assign your next valve problem to Grinnell.



Other Important Features:

Diaphragm absolutely isolates working parts from the fluid stream

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December 1954

Volume 26 Number 12

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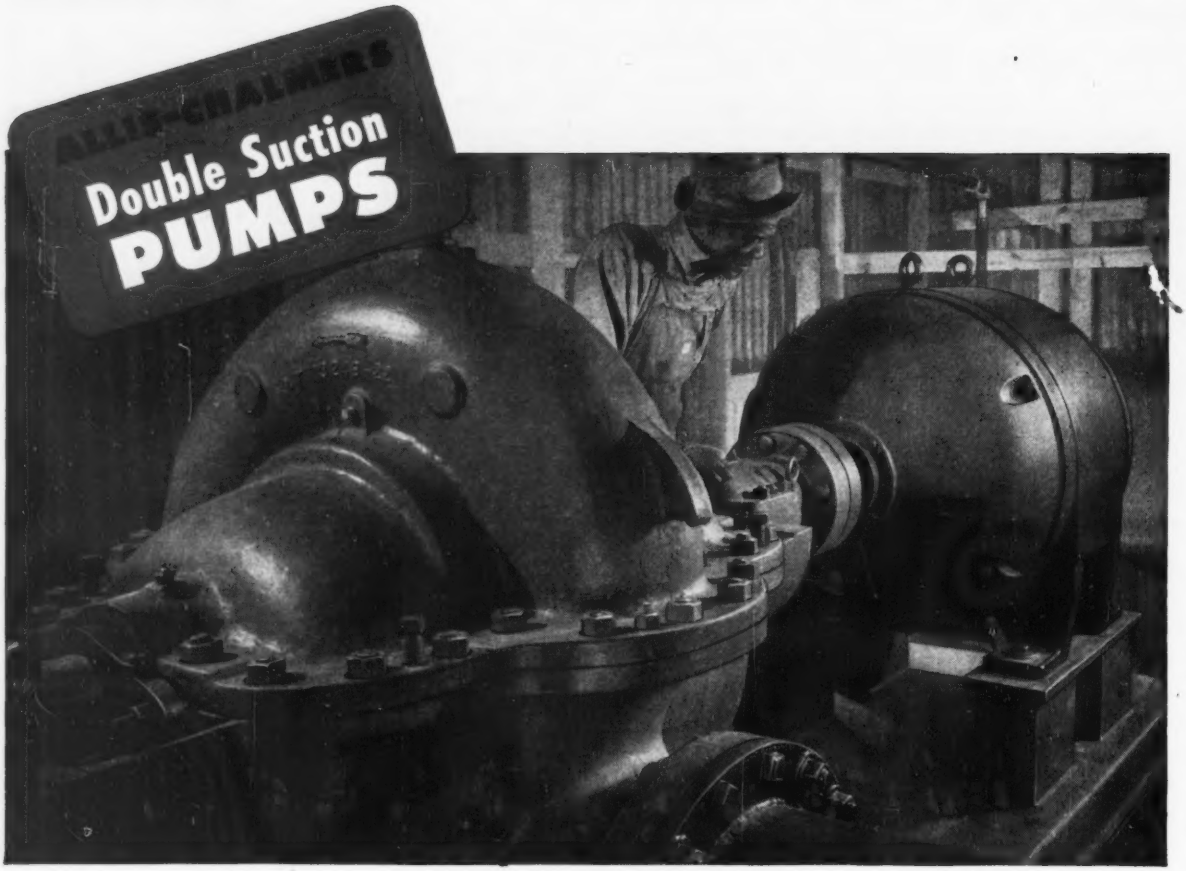

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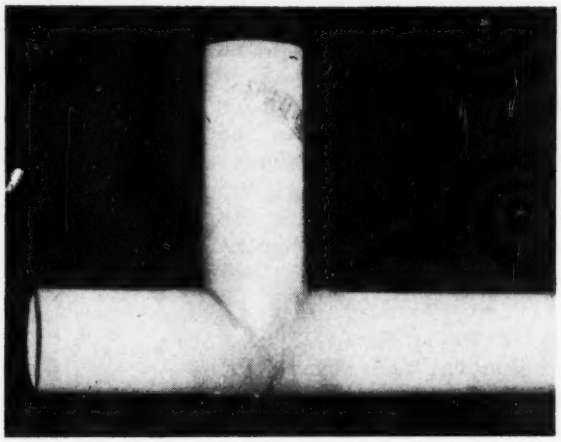
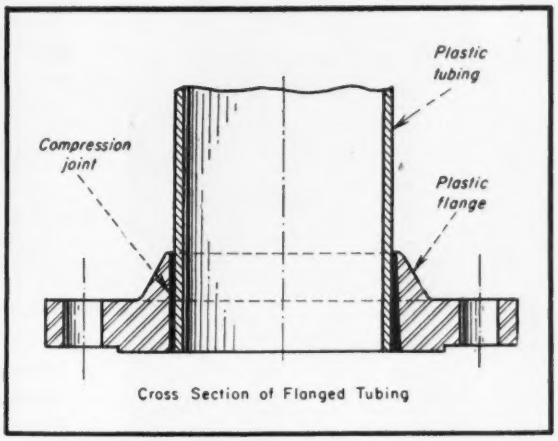
PRACTICAL IDEAS





Cross Section of Flanged Tubing

Makes Reinforced-Plastic Pipe

When the drop lines from our gelatin kettles to the receiving tanks were replaced, aluminum pipe was used for one half and polyester-Fiberglas pipe for the other.

Since this pipe was to run through a congested area, accurate measurements were taken for use in making the prefabricated pipe. This pipe and fittings were constructed by a local machine company.

Three- and 4-in. pipe was made by winding Fiberglas cloth saturated with resin over a cardboard tube mandrel. During the hardening operation, the pipe was rotated slowly to prevent flow of liquid to one side. Soaking the hard tube in warm water softened the mandrel so it could be pulled out easily.

Elbows and tees were made by mitering pipe and wrapping the joints with glass cloth saturated with resin. Straight pipe was joined in the same manner.

Flanges were made of layers of Fiberglas mat cut to shape, saturated with resin and hardened in a steel mold under pressure. Bolt holes were drilled. The hole in the flange was tapered slightly, with the diameter decreasing from hub to face of the flange. A matching taper was turned on the end of the pipe inserted into the flange hole. Polyester resin was used as the adhesive in this tapered joint. Rovings saturated with resin were wound around the pipe and hub of the flange to improve the seal and strengthen the joint.

The assembled lines and fittings were tight when tested by the manufacturer with cold water at 165 psi. Assembly at Atlantic Gelatin proceeded rapidly. When the completed line was pressure tested with hot water, one of the tapered joints between flange and pipe developed a large leak. This joint was cleaned and set again with resin. After the installation, five more joints between pipe and flange failed, indicating that these joints are the weakest part of the installation. All pipe, elbows, tees, joints, and the face-to-face flange connections have not leaked and show no corrosion or wear.

In the manufacture of the flanges, it was necessary to use wax as a mold release on the steel. Not all wax was removed, causing a defect in the joint so that it failed under hot water and steaming out conditions. An improved joint between pipe and flange is now being used and has overcome this difficulty.

From this initial installation, it was learned that polyester pipe must be supported more closely than metallic pipe, especially where the weight of drop lines, valves, or branch lines must be borne by the main line. Under continuous load at elevated temperatures, reinforced plastic acts in a manner similar to glass and deflects slowly. Where a dip has occurred, the pipe can be straightened by putting in an adjustable support. The pipe can then be raised a small amount each day and so restored to its original position.

Since the first installation, Atlantic Gelatin's maintenance department has fabricated and installed a rather complicated dilute acid drain line from two new wooden tanks installed to recover grease from Bird Centrifuge effluent. Four-inch polyester-Fiberglas pipe was purchased from a regular supplier. All fittings were made at Atlantic Gelatin and flanged to Saran-lined valves.

To make tee joints for this installation (see photo) a 4-in. hole was made in the top of the horizontal pipe with a hole saw. The end of the vertical pipe in the tee was cut to shape on a band saw and tacked in position with a single layer of cloth saturated with resin. The joints were later sealed with four layers of glass cloth and rovings wet with resin.

The design of the flange mold was altered to reverse the taper of the hole in the flange, so that the diameter increases from hub to face. To attach pipe to this flange, $\frac{1}{16}$ in. of roving and resin are first wound around the outside of the pipe for a distance extending one-half inch

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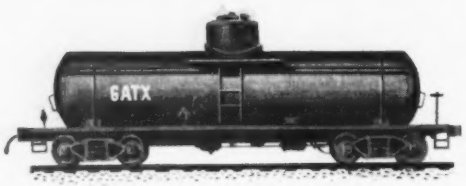
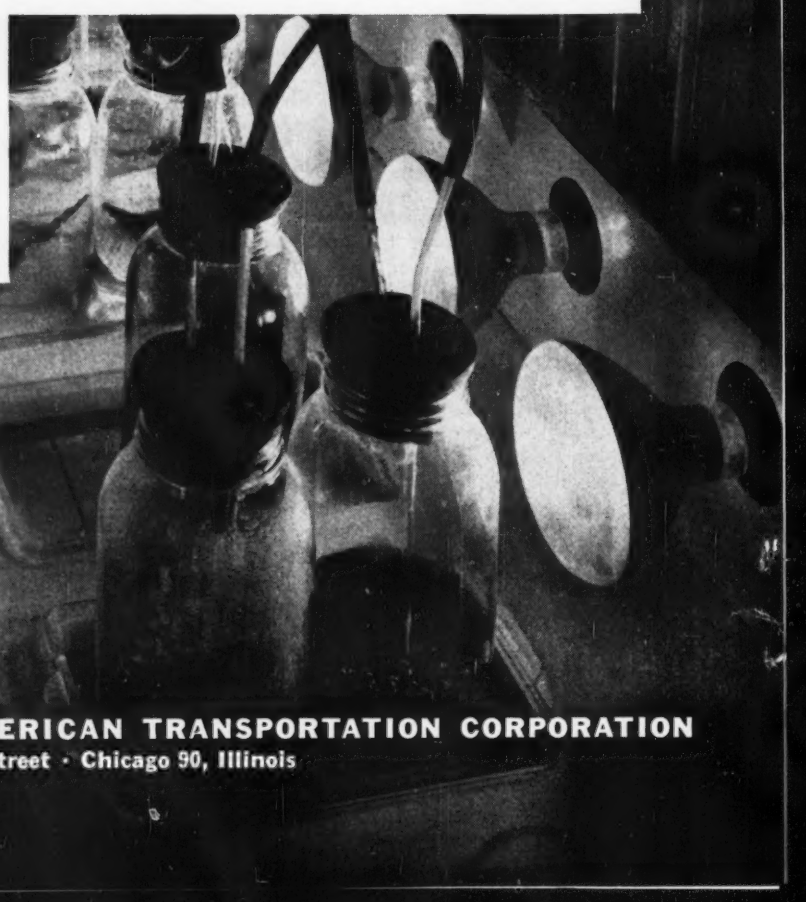
Testing tank car linings is a scientific job at General American. Our Research and Development Laboratory runs "commodity tests" on every liquid carried in GATX tank cars. These two-way tests examine the effect of the lading on the linings and fittings of the cars—as well as the effect of the car interiors on the ladings. They determine the best linings, parts and replacement parts for more than 200 different types of GATX tank cars. Results are also used by our mechanical department in setting standards and times of inspection for each car.

A large, fully-equipped laboratory supports General American's maintenance, design and production departments in building and operating the 48,000 car GATX fleet. The "lab" is one of the facilities that aids General American in giving shippers more dependable service for transporting liquids in bulk.

Car repair shops throughout the U.S.A.
Offices in principal cities

inside information on GATX tank cars





GATX GENERAL AMERICAN TRADE MARK

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from the end to form a strong bead. When this hardens, more rovings wet with resin are wound around the end and tapered roughly to fit the flange.

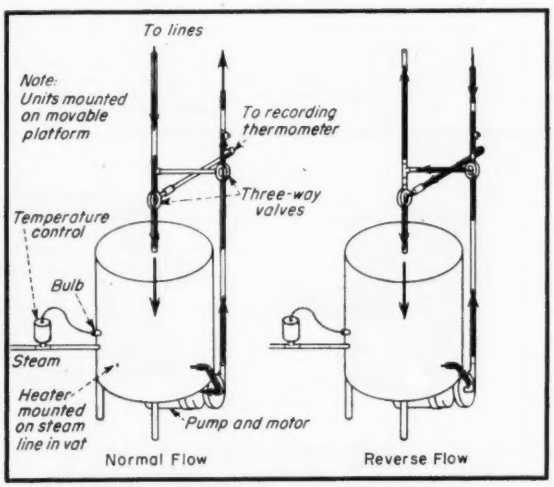
While this second layer is soft, the pipe is forced into the flange until the end is flush with the face of the flange. This gives a compression joint between pipe and flange having good strength. Additional rovings are wrapped on the hub of the flange and pipe to lock the flange to the pipe (see diagram). There have been no failures of this method of attaching pipe to flange.—*Bror J. Grondal, Engineering Dept., Atlantic Gelatin Div. (From General Foods Technical Bulletin).*

Chart Boosts Performance and Pride

At the enrober where the cream center for our Brock Bar is dipped in caramel, the percentage of caramel is checked. Also, the amount of peanuts that the dipped center picks up is calculated.

From this operation, a chart is plotted to show where the weights of samples fall in respect to upper and lower tolerance limits. Then this chart is posted at the enrober to show the operator what kind of job he is doing.

When this control was first started, the operator said that it was of no value to him. But when the checker stopped posting the chart for two days, he asked the quality control supervisor to have it put up again. And he began to take great pride in his work when his operation was well within the tolerance limits.—*W. H. Corwin, Brock Candy Co., Chattanooga, Tenn. (From talk at Midwestern Quality Control Meeting sponsored by Sears, Roebuck & Co.)*



Reverse Flow Improves CIP

New methods have a habit of posing new situations. We went over to in-place-cleaning of sanitary lines—whereupon an objection to our procedure was raised by the local health department. Our problem and what we did to remedy it follow:

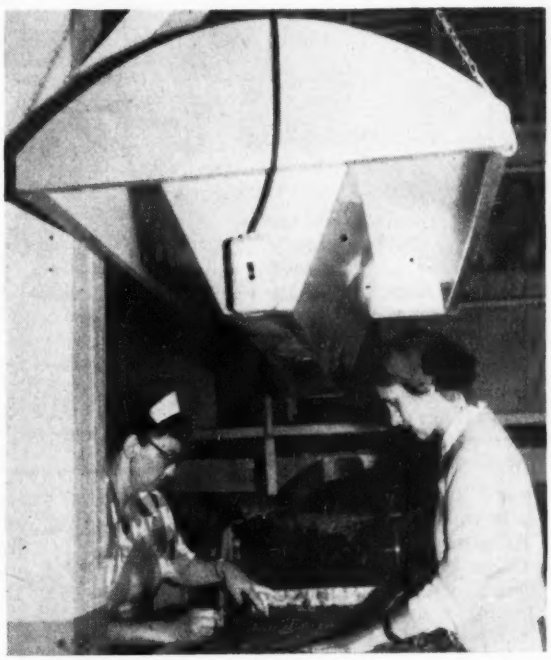
In CIP, there is always the possibility of having a gasket protrude into the line. Since in most cleaning operations flow is in only one direction, only one side of the gasket is cleaned. And the pocket formed on the other side of gasket invites accumulation of product and breeding of bacteria.

To overcome this, we devised a simple rig (see drawing). The unit consists of solution tank, auxiliary piping, steam line, and a temperature control. A pump (beneath the tank) circulates cleaning solution through the lines, and two 3-way valves permit flow to be reversed (shown by arrows in diagrams). If desired, the entire assembly may be mounted on a movable platform.

With this arrangement, we now can clean our lines in both directions. For half the cleaning time, solution is circulated in the normal direction of product flow. Then, without changing lines or even stopping the pump, the two 3-way valves are thrown and the entire flow is reversed.

This method not only assures that both sides of any protruding gasket will be cleaned, but also flushes out any pockets that may form at tees or elbows.

In addition, we find that reversing the flow for a part of the cleaning time does a much better all around cleaning job.—*John J. Buhr, Sales Manager, The Creamery Package Mfg. Co., St. Louis, Mo.*



Good Light, And No Glass

We get two important benefits from a special lighting fixture for our inspection belts—better seeing and protection against broken bulbs. Built in our own shops, this fixture consists of a long, wide metal canopy reflector over a V-shaped trough housing the bulbs.

The fixture provides 100 candle-power of reflected light on the products being inspected. And to avoid glare, we use an amber colored belt (Fabreeka), found to be easy on workers' eyes.

With this fixture, it is possible to change the bulbs readily to alter the color of the light—white for red products, and red for green foods.

The protection against broken glass comes from the shape of the reflector and trough. These protect the glass from high-pressure sprays used in plant cleaning, and the trough prevents glass from falling into the food in event a bulb is accidentally broken by any means.—*Walter E. Helin, Plant Engineer, Pictsweet Foods, Inc., Mount Vernon, Wash.*

Choose from fmc's FAMOUS FAMILY OF M & S FILLERS

The Standard for Progressive Canners because they are UNSURPASSED for ACCURACY

FMC M&S Plunger Fillers have set new standards for high accuracy filling. On the basis of thousands of accuracy of fill tests, by weight testing methods, M&S Fillers are *unsurpassed for accuracy!*

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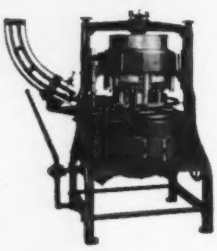
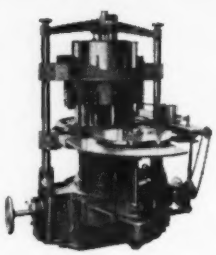
These fillers are engineered for heavy duty and long life. Operating parts are fully enclosed. Drive gears run in oil. All inspection, lubrication, and adjustment points are readily accessible. Non-corrosive metals are used on all contact surfaces. Special "No-Can, No-Fill" feature prevents product waste.

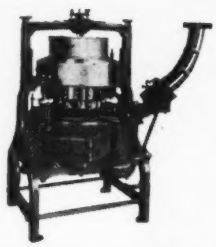
By all comparisons, these are the finest fillers made — designed and built to perform better at lower cost.



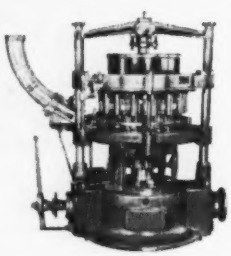
FMC M & S 6 Pocket Fillers
Handles virtually any liquid, semi-liquid or semi-solid product. Can be furnished for can sizes from 202 x 102 to 610 x 910. Speed: 150 CPM in small containers.



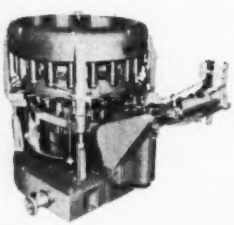
FMC M & S 9 Pocket Fillers
For filling pulps, pastes and liquids in containers from 202 x 203 to 404 x 611 size. Speed: up to 150 CPM on light liquids; 250 CPM on heavier products



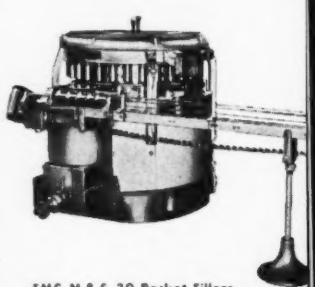
FMC M & S 10 Pocket Fillers
Handles a host of products of varying consistencies from condensed milk to heavy dog food for containers ranging in size from 202 x 102 to 404 x 604. Speeds up to 300 CPM.



FMC M & S 15 Pocket Fillers
For container sizes up to 211 x 400. Handles citrus concentrates, baby foods and other semi-liquid free flowing products at up to 450 CPM.



FMC M & S 20 Pocket Fillers
Delivers up to 500 CPM using jars or cans. Typical products filled are lubricating oil, apple sauce, and chocolate syrup. Handles containers within a range of 202 to 401 diameter.



FMC M & S 30 Pocket Fillers
Designed for baby foods and similar products. Handles 5 to 8 ounce jars or cans at speeds of 600 CPM.

There's an M & S Filler for virtually every product, can size, and can line speed

Write for full information, or call your nearest FMC representative.

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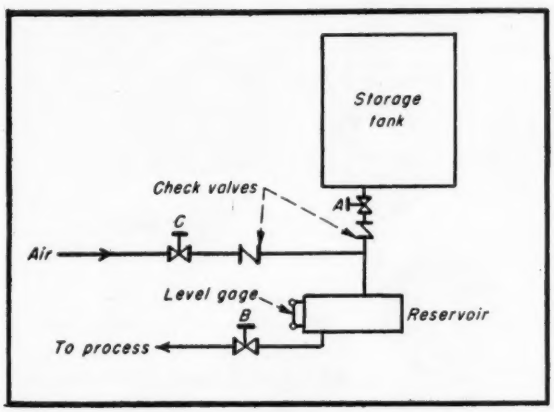
Spare Blades Save Time

The maintenance mechanic has to be prepared for sawing metal bars or sheets in any plant repair job. And if he breaks the hacksaw blade, or does not have a blade of suitable tooth pitch at hand, he wastes time walking to the tool crib.

So it is a good plan to store extra hacksaw blades right on the frame of the saw. As many as six can be secured to the saw backbone by two turns of tape.

A plus advantage of this arrangement is that the blades prevent the frame from collapsing if the blade in use breaks. A lot of fumbling is thus avoided.—*C. T. Bower, Tool Engineer, London, England.*



Measures Dangerous Chemicals

Air pressure, applied to a calibrated reservoir, can deliver corrosive chemicals in measured quantity. And avoiding direct contact with these materials removes the accident hazard to personnel.

Operation is simple with the equipment shown on the diagram. With valve (A) open (B and C closed), the liquid to be dispensed flows into the reservoir by gravity from the main storage tank. When the required amount is admitted (as shown by the liquid level gage), valve (A) is closed and (B) and (C) are opened. Then air pressure is applied through valve (C) to force the fluid out of the reservoir. The process is repeated, of course, by closing valves (B) and (C), and opening (A).

To insure safe operation, check valves are placed on the lines from the storage tank and the air supply. These valves prevent compressed air from entering the tank and corrosive chemicals from contaminating the airline, respectively.

Naturally, when handling corrosive chemicals special attention must be paid to materials of construction.—*FE Staff.*

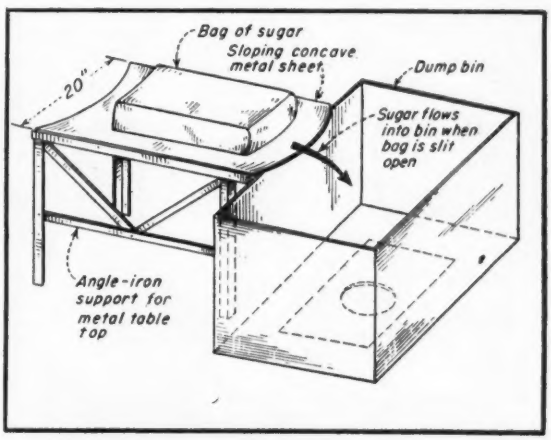
Frees Refrigerator Door of Ice

Condensation and moisture has a bad habit of forming ice around freezer doors. Eventually, this ice forms a seal, making it difficult to open the door. And it then must be manually chipped away with hammer and chisel, a rough practice which often requires the replacement of damaged cork door gaskets—even doors.

But we've now eliminated the expensive and time-consuming operation by employing a door heater—a unit costing less than the replacement of cork gaskets.

The heater consists of a series of two coil-heating wires, installed under a facing plate all around the edge of the door. It has thermostatic controls to allow just enough heat from the wires to melt away any ice and dry any condensation of moisture around the door edge.

Operational expense of the unit is negligible. Total cost, installed, is about $100.—*J. V. Grubbs, Alabama State Docks Board, Mobile, Ala.*


Bag of sugar
Sloping concave metal sheet
Dump bin
20"
Sugar flows into bin when bag is slit open
Angle-iron support for metal table top

Simplifies Bag Dumping

Easier feeding of bags of raw materials, such as sugar, can be achieved with the aid of a special dumping table, this table being adjacent to the dumping bin that supplies conveyors. And with caked materials, the table really becomes a job-easer.

Top of the table is a concave piece of heavy-gage stainless steel, 20 in. across and a few inches longer than the

Season's Greetings!
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Kenneth Leggett
Asst. Tech. Dir.
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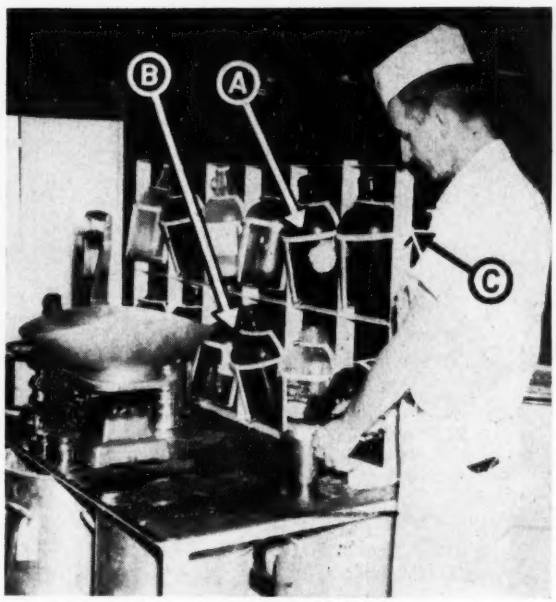
Warren Keller
Mgr., Flour Service Div.
Kansas City
To all our friends, our sincere wishes for a very Merry Christmas and a Happy and Prosperous New Year.
President
Stérwin Chemicals
1450 Broadway, New York 18, N. Y.
IN CANADA:
Sterwin Chemicals Of Canada Ltd.

bags to be handled. This curved sheet is closed at one end, open at the other. It slopes downward toward the open end, which extends over the edge of the dumping bin. The table top thus forms a slightly inclined chute.

A bag to be dumped is placed in the chute lengthwise and slit open to spill its contents into the bin. Any lumps are easily broken up by pounding.

This chute-type table top is supported by angle-iron legs and braces, the rear legs being enough longer than the forward ones to give the desired slope.

A little experimenting with different materials will determine the amount of slope needed.—*FE Staff.*



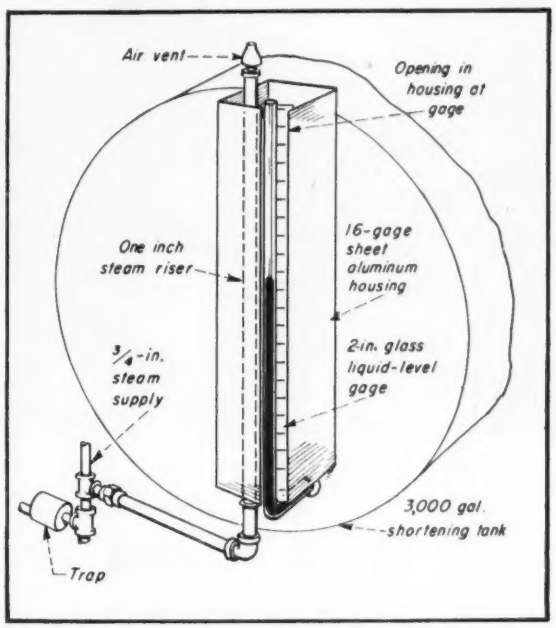
Tilts Jugs on Rack for Pouring

Here's a handy flavor rack that permits jugs and wide-mouth bottles to be tipped for easy in-place pouring, and provides space-saving storage at the same time. Eliminated is the extra time and handling required for lifting a bottle to pour and then replacing it.

For convenient access, this rack was mounted at the back of our work bench (photo). Jugs are held in tilting carriages (A), suspended in sections of the frame. Metal strips (B) fit half way around the necks of the bottles and are secured by two pins on the sides of the carriages. These pins fit into notches (C) in the frame sections to support the carriages and to permit them to tilt.

As shown in the photo, the operator merely tips the carriage to pour from the jug. Then he lets it swing back to an upright position.

Replacing an empty bottle is easy. To do this, the carriage is tilted away from the top of the frame and the metal strip around the neck of the bottle is pushed away from the neck. Empty jug can then be lifted out of the carriage and replaced with a full one. With the metal strip back in place, the new jug is ready for pouring.—*Walter J. Holmes, American Bakeries Co., Jacksonville, Fla.*



Keeps Fat Fluid in Gage

We determine the contents of a shortening tank with a glass liquid-level gage. But when shortening congeals in the tube, accurate readings are impossible.

The problem was solved by installing a steam riser alongside the gage and shielding the unit with a sheet-metal housing. With heat from the riser keeping the shortening in the gage tube fluid, we get correct readings at all times. And this device is applicable to other similar congealing fluids.

As shown on the diagram, the riser is a length of 1-in. pipe connected to a ¾-in. steam supply line, and equipped with air vent and steam trap. Steam pressure of 5 to 15 psi. is sufficient to prevent the shortening from solidifying in the 2-in. gage tube.

The shield is made of 16-gage aluminum. It is secured to the steam riser, at the bottom, with a U bolt. At the top, it is fastened to an angle iron welded to the tank.—*Frank Carnazza, Plant Engineer, Stella D'Oro Biscuit Co., Bronx, N. Y.*

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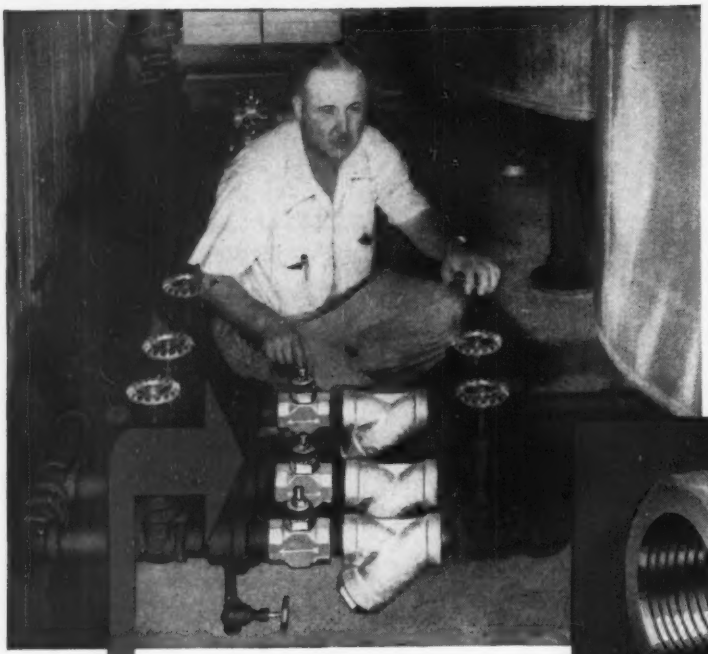
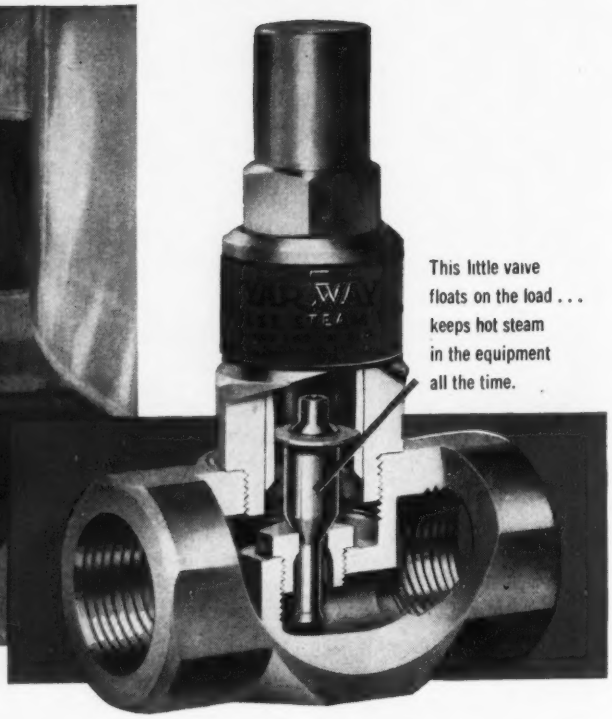
Also, $5 to $15 is paid for each contributed item used. So a few minutes time may net you as high as $65.

Just send us the facts about your idea and its application. And include a free-hand sketch or snapshot to illustrate it.

We'll do the finished writing and drawing for you. Send it today, before you forget. Address it to Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.—The Editors

OCTOBER PRACTICAL IDEA WINNER was "Lift Protects Product Quality," submitted by Marcel G. Eye, Food Technologist, The David Crystal Co., Los Angeles.





This little valve floats on the load . . . keeps hot steam in the equipment all the time.

THESE STEAM TRAPS GIVE FASTER HEAT-UP ON TOMATO COOKERS *PLUS 5 EXTRA BATCHES PER DAY!*

RIPE tomatoes can't wait and they don't have to at the P.M.C. Canning Company, Swedesboro, New Jersey.

The owner of this large tomato and pizza sauce cannery found that by switching to YARWAY Impulse Steam Traps on his 1500 gallon cooking kettles, he was able to speed up the heat-up period enough to give *5 to 6 extra batches per day*. In addition, only with YARWAYS could high boiling temperatures be obtained quickly enough for proper pizza sauce processing.

That's because the little stainless steel valve (the only moving part in a YARWAY trap) opens wide when steam is turned on and discharges air and condensate *continuously* until production temperature is reached. After that, by a pulsating action, each tiny bit of condensate is discharged as it forms—maintaining steady, maximum temperature in the equipment.

This makes for profitable steam trapping. So do these other YARWAY advantages—low initial cost, low maintenance, stainless steel construction, easy close-quarter installation, quick availability from more than 200 local industrial distributors.

Try a YARWAY Impulse Trap FREE for 60 days in your plant. It's the best test. Your distributor will supply the trap. For his name, write . . .

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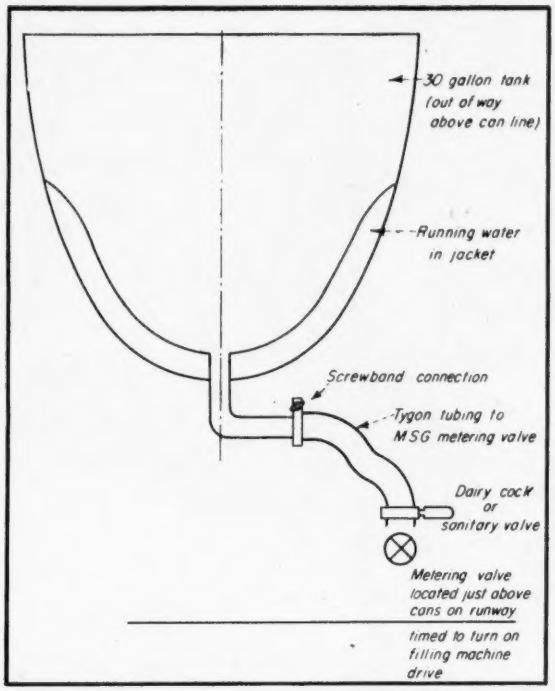
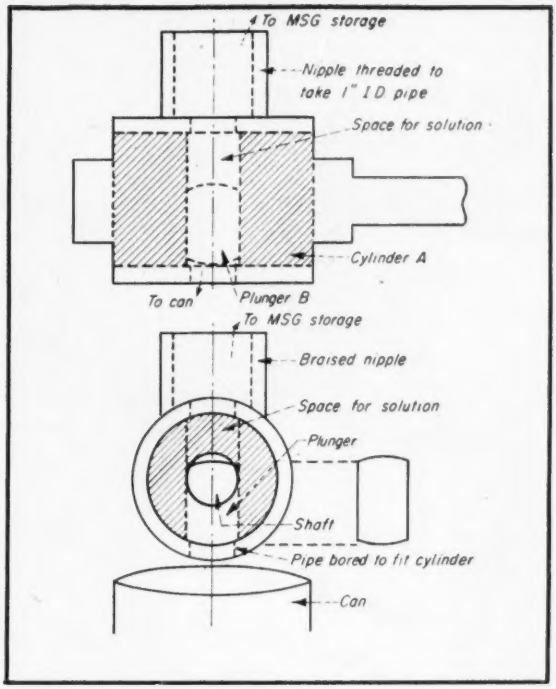
the steam trap designed with more production in mind

For more information, use coupon on last page.


30 gallon tank (out of way above can line)
Running water in jacket
Screwband connection
Tygon tubing to MSG metering valve
Dairy cock or sanitary valve
Metering valve located just above cans on runway
timed to turn on filling machine drive



Easy and Accurate Way to Add MSG

At our plant, the method of adding monosodium glutamate to cans of seafood had proved unsatisfactory.

First, we mixed it with salt and water in two 200-gal. tanks. Then we pumped the mixture into a multi-valve brass briner, which brought water content of the cans to the desired net weight and also dispensed the food chemicals.

This method involved considerable space for the equipment. Also, there was the danger to our foods from use of the copper-containing units. Furthermore, the brine leaked from the valves during lunch and relief periods. And there was occasional over-filling, with subsequent displacement by a topper.

If the exact volume required for a day's run was not made up, the excess was wasted. On the other hand, an under-volume batch naturally meant hasty mixing of an auxiliary batch.

Obviously the accuracy of salt and MSG addition was dependent on the head space available in the can. In spite of constant weighing at the "check stand", considerable variation resulted.

Then, after some pilot plant work, we also found it unfeasible to add a dry mixture of salt and MSG in the cans. First of all the expense of a salt resistant mixer was too great, and secondly there was no assurance that a means could be devised to deliver a uniform flow of both salt and MSG from storage.

Present successful system of proportioning monosodium glutamate and salt to cans employs the following equipment:

1. A rented machine that dispenses salt into empty cans ahead of that filler.

2. A jacketed stainless steel container (left sketch). This was mounted above filler and graduated to indicate gallons by marks on inside. Tank is jacketed so water may be circulated to maintain a cool temperature on MSG solution, which is made of 1 lb. of MSG per gallon of water. This liquid is carried from storage through Tygon tubing (1½ in. dia.) to a metering valve of our own design mounted directly above can line at point where empty cans approach filler.

This metering valve (right sketch) consists of a bored stainless steel cylinder containing a plunger turning in a housing, and timed on the can drive to rotate 180 deg. as each can passes under the valve. The hole is filled with MSG solution when the plunger is in the bottom position.

Each time the cylinder turns 180 deg., the plunger falls to the other end of the hole, assuring complete emptying of contents and permitting the hole to fill again from storage. Approximately 1 cu. in. of solution per can satisfies our MSG requirements.—*W. H. Hastings, Production Manager, and Chris Johnson, Cannery Foreman, Marine Foods Packing Co., Seattle.*

Pepping Up Small Motors

Small commutator-type electric motors are badly and lose power when the commutator becomes uneven with wear.

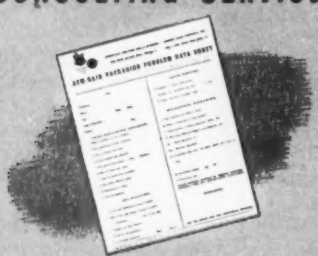
This can be remedied by smoothing the commutator surface. And for a small plant lacking a machine shop or special motor-maintenance tools, here's an easy, quick way to do the job.

Remove the armature from the motor and insert the end of the shaft opposite the commutator into the chuck of ¼- or ½-in. portable electric drill, held securely in a bench stand. Then run the drill to spin the armature, and hold a fine flat steel file against the armature surface. Remove enough copper from the commutator to give it an even, shining surface.

A small armature is supported adequately by the drill chuck. For larger, heavier sizes, the other end of the shaft can be supported in a hole drilled into a piece of wood, this piece being fastened to the bench on which the drill is mounted.

Drill presses also can be used to revolve armatures for "dressing" the commutators. But be sure that the armature is supported in the chuck so that it will not drop out and be damaged or injure the operator.—*FE Staff.*

Free
CONSULTING SERVICE



SEND FOR *the GAIR-ACM Packaging Problem Data Sheet! Fill in and return it for a scientifically accurate analysis and recommendations. Our skilled engineers will apply their vast experience, their specialized knowledge of paperboard, construction, design, color harmony, mechanical production, merchandising, and other factors to your specific problem! Extensive GAIR-ACM Mills and Plants produce many types of Paperboard. We can therefore select the ONE BEST grade for your needs. This valuable "Precisioned Packaging Service" does not obligate you in any way. Write today!*

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GAIR-ACM folding cartons stand out. They catch the eye. They hold attention. They increase sales! One secret of their success lies in the brilliance and beauty of their colors. And, GAIR-ACM "Precisioned" printing adds an atmosphere of quality that means so much in retail stores.

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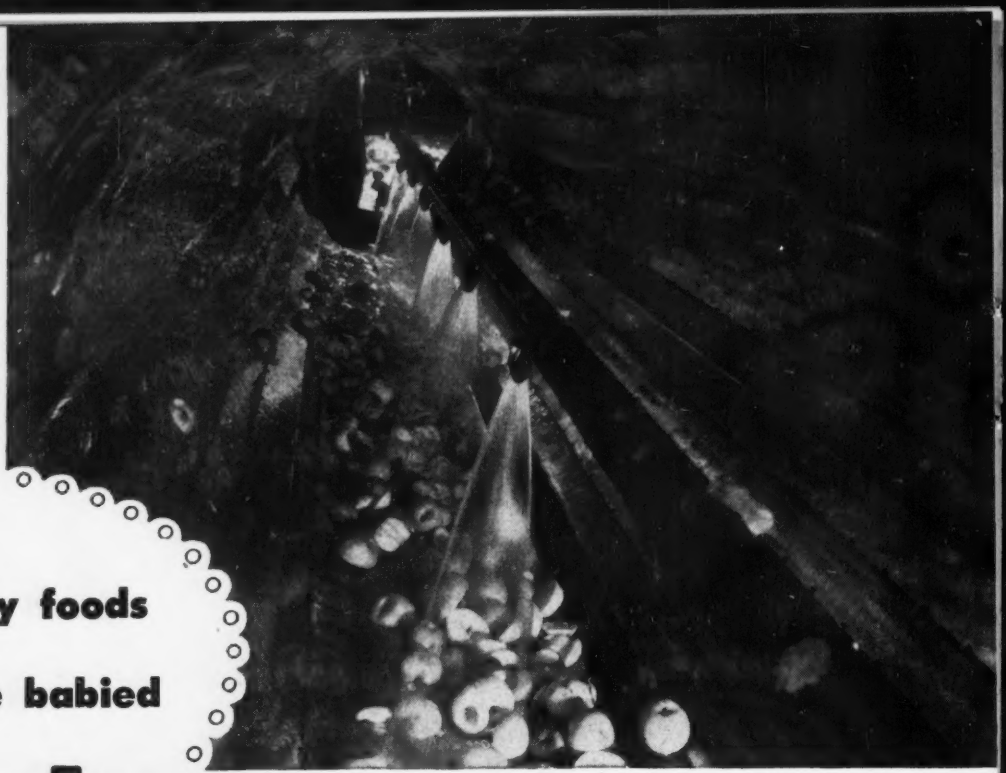

LOOK INTO THE GLEAMING, clean interior of a Stainless Steel rotary washer. Apples are tumbled under a stream of water at an early stage in preparation. The washer was fabricated by Leitelt Iron Works, Grand Rapids, Mich.

when baby foods

have to be babied

Gerber

FINDS YOU CAN'T BEAT STAINLESS STEEL

THIS STAINLESS STEEL VOTATOR is used for rapid sterilization and cooking of such acid products as apples, peaches and pears. This continuous closed heat transfer process equipment was manufactured by Votator Division of the Girdler Corporation, Louisville, Ky.

"BABIES are the most important people" to Gerber Products Company, Fremont, Mich. That's why protection of quality and purity comes in for such close attention in processing Gerber's Baby Foods. And that's why Stainless Steel holds down so many vital spots in the production line.

As food in process passes through the receiving, preparation, kitchen, cooking and canning departments, about the only thing it touches is Stainless Steel. That's because Stainless Steel has such superior corrosion resistance . . . because it is unaffected by food acids and prevents contamination of the product . . . and because its ease of cleaning makes "housekeeping" so much easier.

Stainless Steel equipment at Gerber's includes steam peelers, rotary washers, trim bins, work stations at the picking belts, screw steamers, hammer mills, finishers, holding tanks and filling machines.

If your operations call for equipment that is easy to clean and easy to keep clean . . . equipment that resists corrosion . . . equipment that lasts and lasts, Stainless Steel is the logical choice. But be sure it is perfected, service-tested USS Stainless Steel, made to give you the finest performance.

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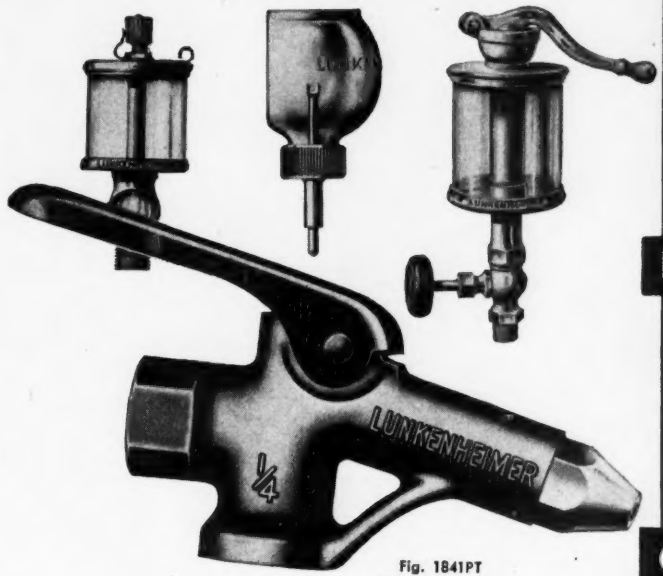
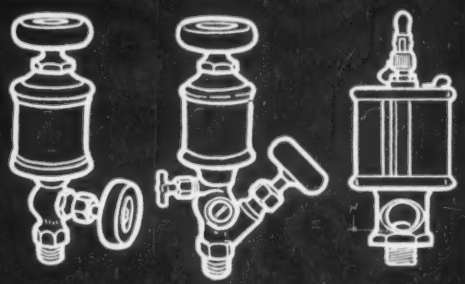
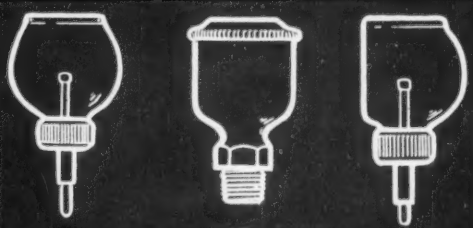


Fig. 1841PT
150 lb. Air Nozzle

AIR DEVICES



LUBRICATORS



OIL AND GREASE CUPS

Yes, Lunkenheimer produces the highest quality Engineering Devices, as well as the world's finest valves. And today — with the high cost of maintenance growing still higher—you NEED the extra margin of quality in design and workmanship that has made Lunkenheimer products world-famous.

Make your expensive machinery last longer with Lunkenheimer Lubricating Devices. Cut the high cost of compressed air leaks with Lunkenheimer Air Nozzles and Cocks. Keep accurate check on your storage tanks and reservoirs with Lunkenheimer Liquid Gauges. All these carefully designed, carefully cast, carefully machined bronze accessories assure *longer* wear with *less* repair. The complete Lunkenheimer Line includes oil cups, grease cups, lubricators, cocks, nozzles, liquid gauges, and whistles. See your Lunkenheimer Distributor, or write for literature to The Lunkenheimer Co., Box 360Q, Cincinnati 14, Ohio.

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B. F. Goodrich announces

New Koroseal belt has no odor, no taste, never gets rancid

IN this bakery, fresh bread used to ride a canvas belt from ovens to wrapping tables. But oily film clinging to the warm loaves stained the canvas, made it impossible to keep clean, soon ruined it.

Then the smooth, polished Koroseal belt in the picture was tried, and it solved all these problems at once. Because it's made of Koroseal flexible material, this new B. F. Goodrich belt stands cooking oils, animal fats, most acids—and stands hard use, rough handling, and just about everything else that ruins most materials.

Unlike belts that are just coated with plastic, Koroseal is used throughout this B. F. Goodrich belt, and so resists cracking and peeling, never gets soft or sticky. Oil can't penetrate Koroseal's tough surface, food particles can't grind in. That's why this belt is so easy to clean. Most stains, grease, even sticky icings come off with a damp cloth. Either way, cleaning time is cut in half!

Other new belts, developed by B. F. Goodrich for food handling, include a thin white Koroseal belt for use in cooling tunnels, and two belts, called Highseal and Kleenseal, that are made of new types of rubber compounds. Their "sight-saving" green color reduces glare and eye strain on packaging and inspection lines.

Find out more about these longer-lasting, work-saving food handling belts. Have your BFG distributor survey your belting needs and recommend the right B. F. Goodrich belt for your process. If you don't know the distributor nearest you, write us and we'll have him call you. *The B. F. Goodrich Company, Dept. M-346, Akron 18, Ohio.*

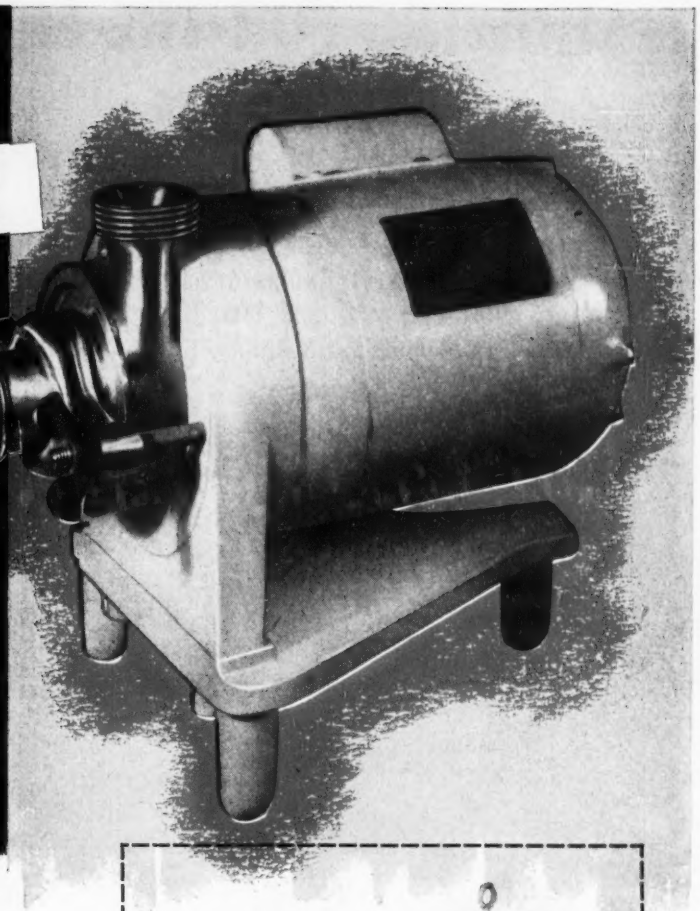
Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

TRI-CLOVER

Nofome

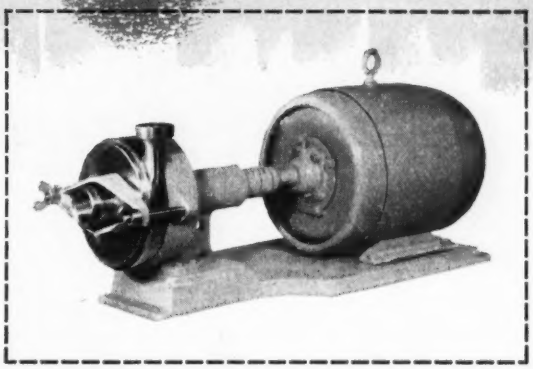
SANITARY CENTRIFUGAL PUMPS for high head requirements



These well-known *"NOFOME"* pumps, formerly made by Specialty Brass Company, have been refined and are offered exclusively by TRI-CLOVER.

Incorporating the latest design and operating developments, including the popular Carbon Rotary Seal, these improved *"NOFOME"* Sanitary Centrifugal Pumps are particularly applicable in beverage, food and dairy applications for meeting high head requirements.

Here are a few of the *"NOFOME"* design features: 3-bladed impeller gives maximum efficiency without foaming or churning . . . heads are smooth—no pockets or crevices . . . heads easily removed for thorough cleaning . . . rotary seals located outside product zone . . . 2 roller bearings assure long life and quiet, trouble-free operation.



TRI-CLOVER *"NOFOME"* PUMPS are available in either "Pump King" type (top) or Pedestal Mount (bottom) in a wide range of capacities for handling from 1,000 to 280,000 pounds per hour (water or liquids of similar viscosity). Heads up to 260 ft. available. Supplied with patented inert carbon seals, or water-cooled rotary seals for a wide range of liquids and solids in solution.

For further details on the full line of Tri-Clover Centrifugal Pumps write for Catalog No. 253.

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Tri-Clover Division

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P454

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A New Addition to the Dempster-Dumpster System of Low Cost Bulk Materials Handling

Now you can have either of two types of Dempster-Dumpsters in the fastest, most efficient and lowest cost method of bulk materials handling ever devised.

IN THIS MODERN, low cost system, one truck-mounted Dempster-Dumpster picks up, hauls and empties, or sets down intact, one loaded detachable Dempster-Dumpster Container after another, regardless of design or size, handling bulk materials of practically every description.

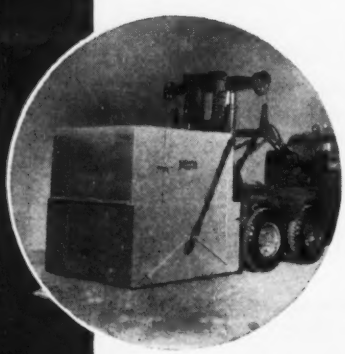
The new Dempster-Dumpster Type DTLF offers several desirable features along with all the economies provided by the Type LFW. These features include: (1) Improved load distribution with container carried in more forward position between wheel centers. (2) Extreme high dumping in cases where it is desired. (3) Vertical pick up of loaded container. (4) Container, loaded or empty, is always in horizontal plane in carrying position. Automatic locking device for positive rigidness of container while in carrying position is, of course, provided.

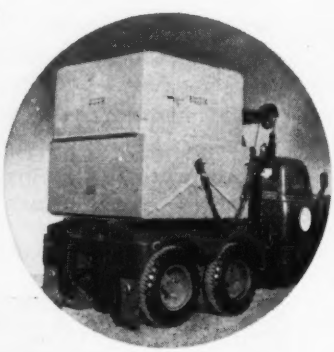
TREMENDOUS SAVINGS WITH THE DEMPSTER-DUMPSTER SYSTEM HAVE BEEN PROVED BEYOND QUESTION.

One truck-mounted Dempster-Dumpster, operated by only one man, the driver, serves scores of containers of various capacities up to three times greater than the average dump truck. You eliminate trucks standing idle . . . eliminate re-handling of materials . . . eliminate loading crews. You increase efficiency, sanitation and good plant-keeping.

Containers range from 2 to 21 cu. yds. capacity for use with recommended type Dempster-Dumpsters. Each container is designed to suit the materials to be handled—be they trash, rubbish, liquids, dust, bulky, light or heavy. Many leading plants, in almost every type of industry, have found it indispensable after installation. Its proved savings alone justifies an investigation of its potential value in your plant now. Write to us today for complete information. Manufactured and sold exclusively by Dempster Brothers, Inc.

The photo at left illustrates the amazing ability of the Type DTLF Dempster-Dumpster for high dumping. The three photos below show the Pick Up, Haul and Dumping action, hydraulically controlled from cab.





DEMPSTER

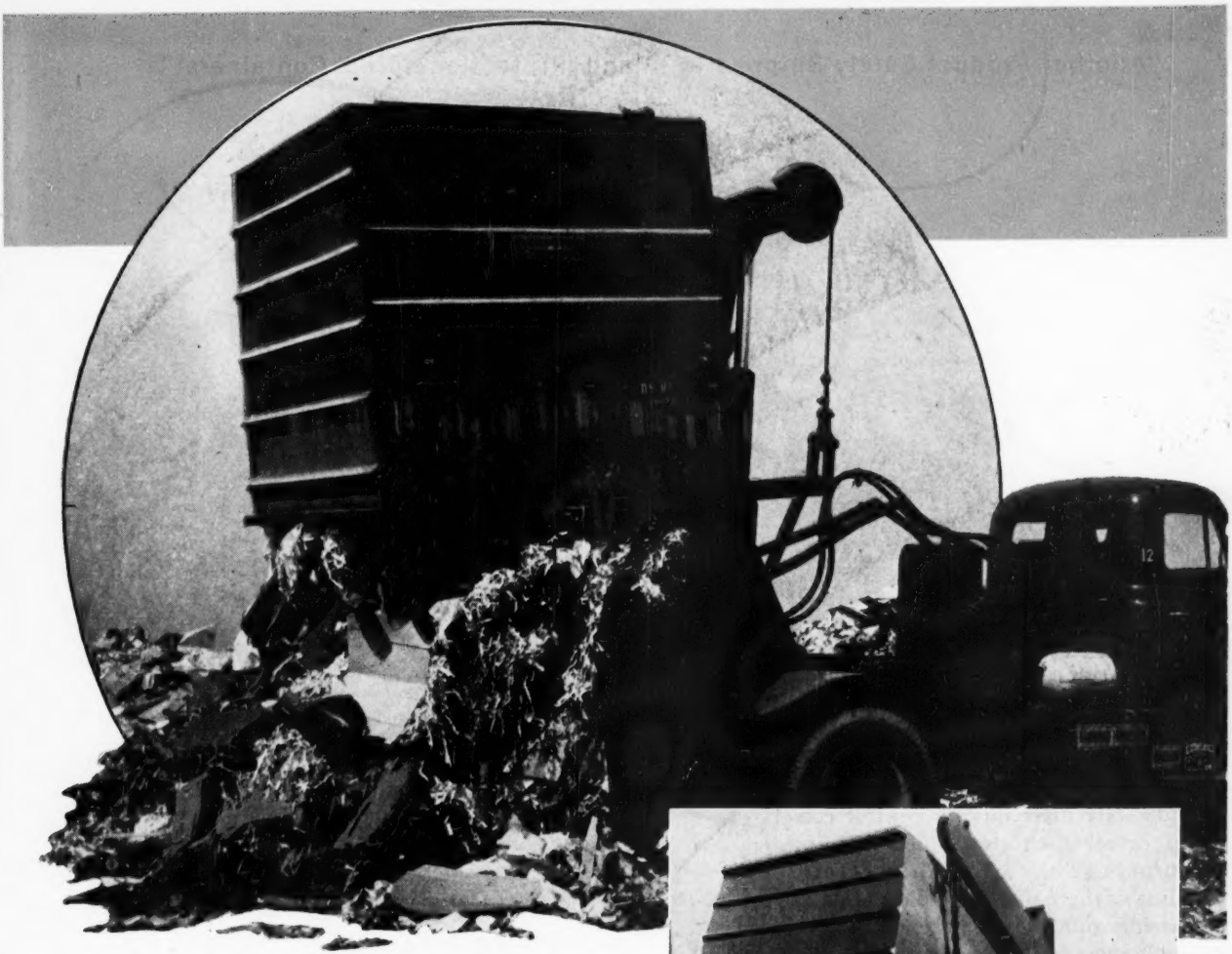
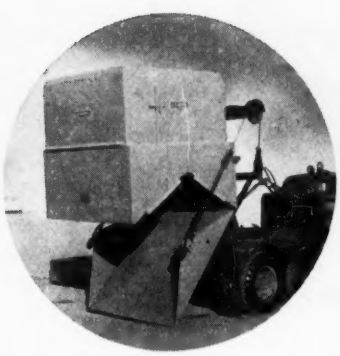


Photo above shows the new Dempster-Dumpster Type DTLF dumping 8 cu. yds. of rubbish. At right you see the Type LFW with load in carrying position. Dempster-Dumpsters are available in capacities capable of handling up to 38,000 pound payloads.



One Truck-Mounted
Dempster-Dumpster Handles Scores
of Containers... All Designs... All Sizes

BROTHERS **7124 SHEA BLDG.** **KNOXVILLE 17, TENN.**

"Another Product Safely Shipped in Inland 'Protection-eered' Containers*"

Every time the chef of a famous hotel or restaurant mixes up a batch of soup, using Continental's Pure Dehydrated Soup Mix, he puts his reputation in it!

That's why Continental Coffee Company, one of the leading producers of coffee, soup mixes, sauces and syrups, must be extremely quality control conscious in selecting their bulk shipping containers. They know that careful blending of ingredients, rigid controls on processing and regular batch testing of their products insures quality only as far as their shipping platform. From that point on, quality control must be entrusted to the shipping package. Even the slightest contamination from the container would ruin the flavor of the product inside.

In the many years Inland Steel Container has been supplying specially lined pails to Continental Coffee Company, they have not experienced a single case of product contamination during shipment.

Inland's "protection-eered" containers have provided the solution to tough packaging problems for some of the country's leading companies. Maybe they can help solve yours.

IT'S BETTER TO SHIP IN STEEL

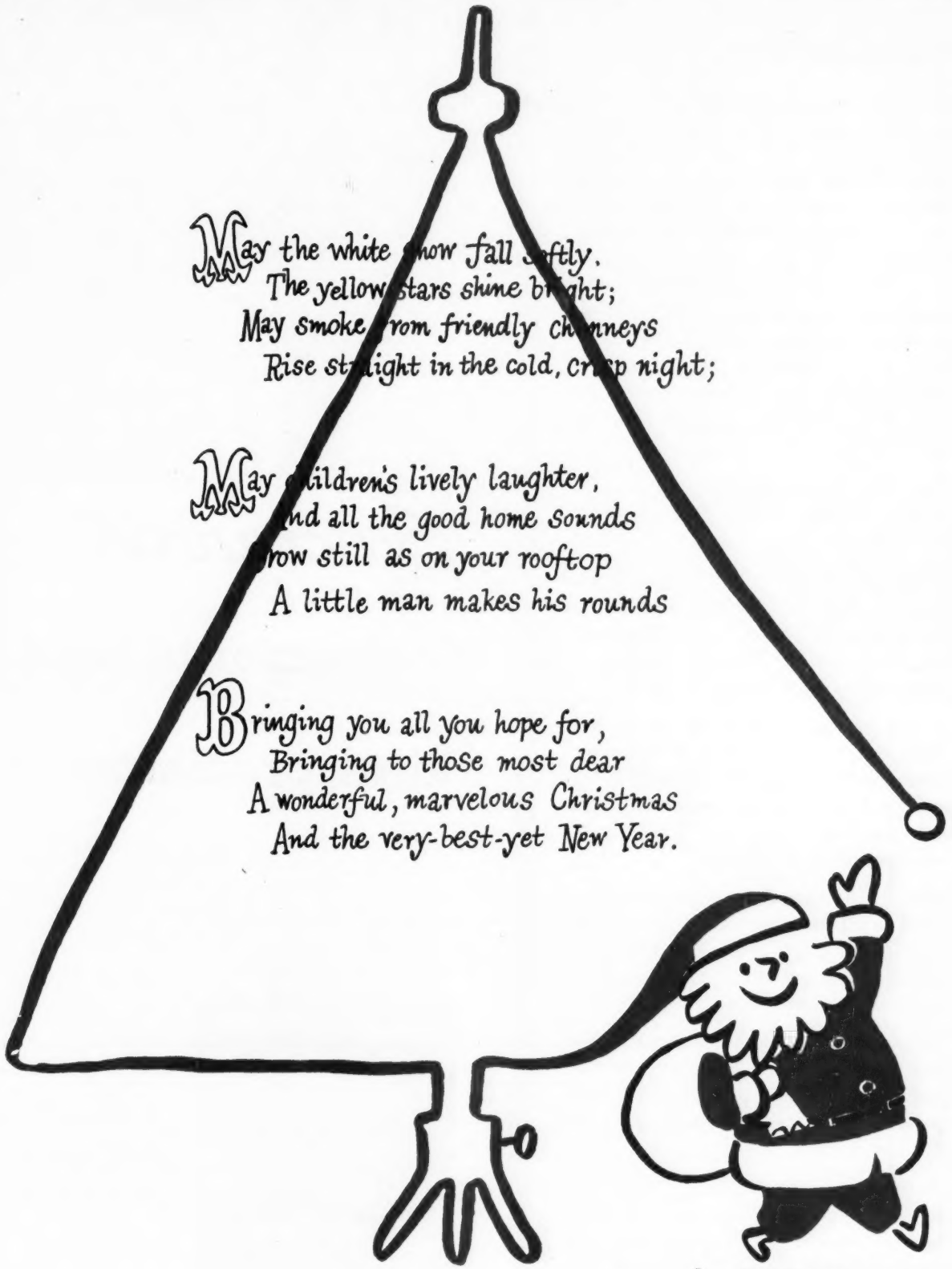
INLAND

Food Division, Dept. A

INLAND STEEL CONTAINER COMPANY

Division of Inland Steel Company
6532 South Menard Avenue, Chicago 38, Illinois
Plants: Chicago • Jersey City • New Orleans

*the right container, with the right protective lining for your product.


May the white snow fall softly.
The yellow stars shine bright;
May smoke from friendly chimneys
Rise straight in the cold, crisp night;
May children's lively laughter,
And all the good home sounds
Grow still as on your rooftop
A little man makes his rounds
Bringing you all you hope for,
Bringing to those most dear
A wonderful, marvelous Christmas
And the very-best-yet New Year.

NORDA, Inc.
601 W. 26 St., New York, N.Y.

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For more information, use coupon on last page.

Modernizing?

New equipment needs the right instrumentation

When you're planning to install new process equipment, plan to take advantage of the full potential of modern methods of measurement and control. It's the sure way to get top value for your modernization investment . . . for the improvements in production economy, quality, and versatility possible with today's new process equipment depend increasingly on control instrumentation.

Here are two important points that deserve consideration if you're planning to modernize:

1. *Design for control.* Instrumentation is more than a necessary appendage. It's a vital, integrated part of the process itself. *Control design goes hand in hand with process design.*

2. *Get the right instrument for the job.* This seems obvious—but all too often instruments may be stretched or squeezed to fit applications for which they were never intended. *Each instrument should fit its function.*

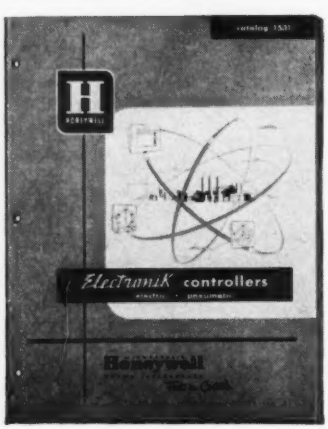
Honeywell's experienced application engineers will be glad to cooperate with your own staff to recommend ways in which you can obtain the full benefit of modern instrumentation.

Honeywell offers an exceptionally wide line to choose from. You're sure to find instrumentation with exactly the right performance . . . at the right cost . . . to fit your process.

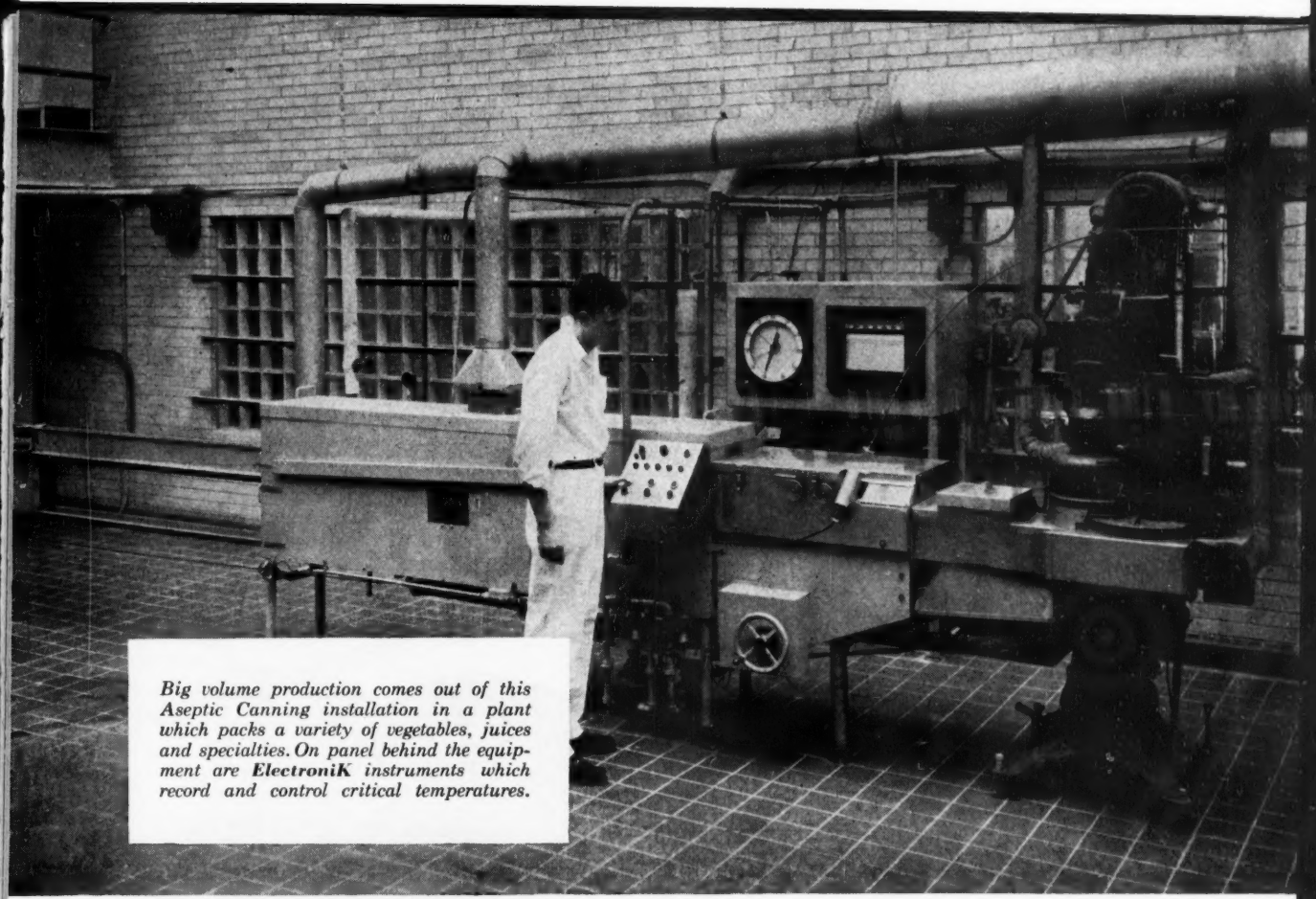
A talk with your nearby Honeywell sales engineer will give you a detailed picture of what instrumentation can mean in your modernization program. Call him today . . . he's as near as your phone.

*ElectroniK**

instruments lend vital precision



For information on the varied line of ***ElectroniK*** *instruments applicable to food processing operations, write for your copy of Catalog 1531,* ***"ElectroniK Controllers."***



Big volume production comes out of this Aseptic Canning installation in a plant which packs a variety of vegetables, juices and specialties. On panel behind the equipment are ***ElectroniK*** *instruments which record and control critical temperatures.*

to aseptic canning process

REVOLUTIONARY is the word for the Martin Aseptic Canning Process. Embodying short-time high-temperature sterilization and aseptic filling, this high-speed operation retains natural flavors, colors and nutritive value of many foods . . . including fruit juices, vegetables and even fresh, whole milk.

To help in the practical realization of this unique concept, the process designers called on *ElectroniK* instruments. Requirements were severe . . . measurements had to be fast and accurate . . . control had to be sensitive and dependable . . . because the process functions at high speed and within close limits. But on every score, *ElectroniK* instrumentation proves equal to the task.

An *ElectroniK* controller holds product temperatures to tight tolerances in the critical heat-exchanger sterilizer, and at the same time provides management with a permanent record as evidence of proper process functioning.

Supplementing this instrument is a multi-point recorder which charts other vital temperatures in the cooling and filling equipment. The whole control center is engineered by Honeywell as a complete, integrated system which incorporates all essential signalling and safety devices.

The same Honeywell combination of accurate instrumentation and process control engineering is ready to serve your own food production operations. For a discussion of your problems, call your local Honeywell sales engineer . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA: Write for Data Sheet No. 3.2-15a, "Aseptic Canning Process."**

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS*

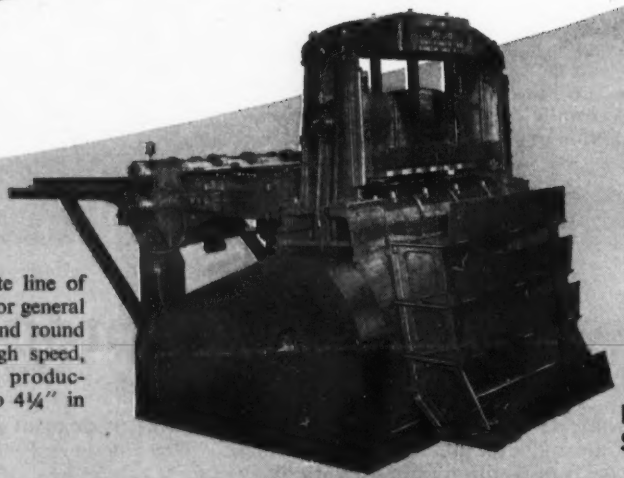
First in Controls

*Trade mark of the Minneapolis-Honeywell Regulator Co.

HAMILTON Can Body Flanger

Model 301 automatically flanges 300 to 600 cans per minute, depending on your requirements . . . for round cans up to 4¼" diameter. For the higher speeds an automatic spiral feed can be supplied. Three other high-speed flangers for larger round cans and square cans.

HAMILTON

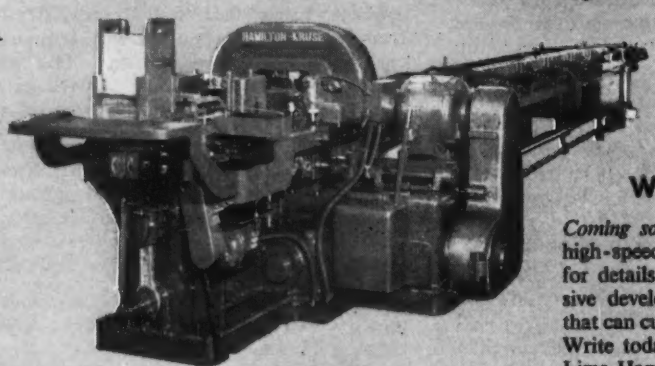


HAMILTON Bodymakers

Only Hamilton offers a complete line of high speed modern bodymakers for general line production of rectangular and round cans. Model is designed for high speed, completely automatic long-run production of can bodies from 2⅛" to 4¼" in diameter and 2⅜" to 5½" in height.

HAMILTON Scroll Shear

Cuts costs by speeding output and saving 4-7% in tinplate. Handles sheets 25" to 36" square up to 125 strokes per minute.

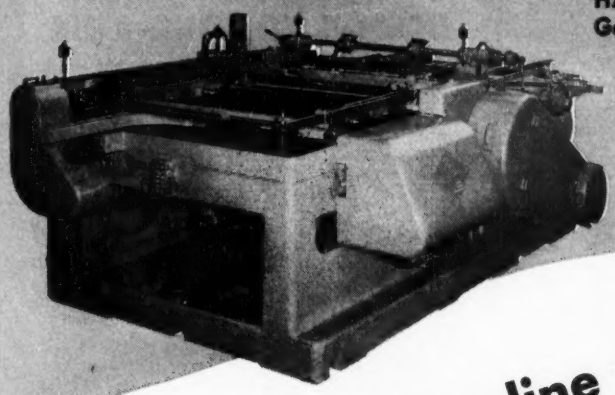


WATCH HAMILTON!

Coming soon from Hamilton . . . more new high-speed, automatic machines. Contact us for details of Hamilton's continuing progressive development of revolutionary machines that can cut drastically your can making costs! Write today to Hamilton Division, Baldwin-Lima-Hamilton Corp., Hamilton, Ohio.

BALDWIN BLH LIMA-HAMILTON

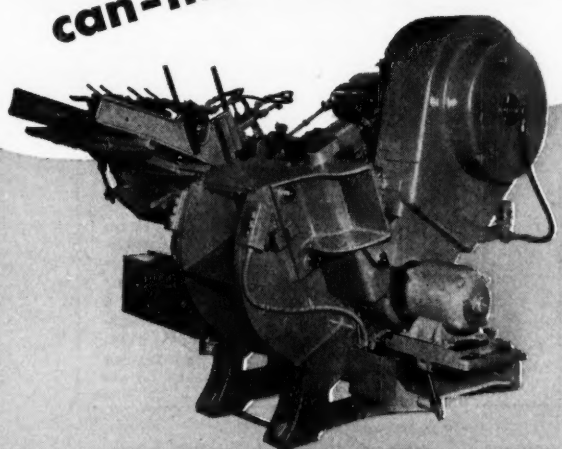
BALDWIN



HAMILTON Duplex Gang Trimmer and Slitter

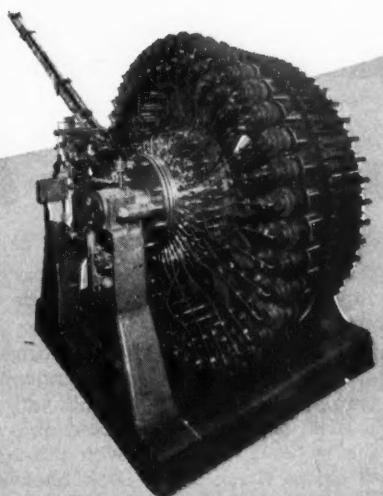
Boosts production by slitting up to seventy 36″ sheets and cutting them into body blanks each minute. Newly designed for less maintenance and lower operating costs.

..world's most complete line of modern...high-speed...cost-cutting can-making machinery



HAMILTON Strip Feed Press

Built to last!... The last word in high-speed, low-maintenance strip feed presses.



HAMILTON Can Tester

Capable of speeds above 300 cans per minute, model 301 automatically tests sanitary cans with diameters up to 4¼″ and heights up to 7⅜″. Model 302 tests larger cans.

LIMA • HAMILTON

HAMILTON DIVISION • HAMILTON, OHIO

For more information, use coupon on last page.

Costs less - Delivers more!

Savings up to 33% . . . efficiency up to 97% . . . are yours with this new and better kind of speed reducer. Proved in tens of thousands of installations, in all types of industry!

This reducer is mounted directly on the driven shaft. No foundation, no flexible couplings, no sliding base required. No lining up difficulties. The torque-arm, fastened to any fixed object, anchors the reducer. Unit is driven through any V-belt drive. Stock Taper-Lock Sheaves prescribed for each job. Tri-Matic Overload Release and Backstop are available if desired.

Torque-Arm Speed Reducers are sold from Distributor's stocks—in single reduction and double reduction series—with capacities from 1 to 43 hp, output speeds from 12 to 330 rpm.

THIS ENGINEERING CATALOG FREE

256 pages of helpful information on Dodge products, including sectional drawings, dimensions, prices, details on applications, engineering tables and other data. Virtually a manual on mechanical power transmission machinery. Write for copy.

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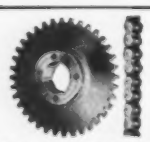
DODGE
of Mishawaka, Ind.



TAPER-LOCK SPROCKETS AND DODGE ROLLER CHAIN

TAPER-LOCK SHEAVES

DODGE-TIMKEN PILLOW BLOCKS

Call the Transmissioneer, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

get bigger sales from a health-minded America

fortify foods and beverages with

PFIZER VITAMINS

● The importance of proper nutrition has come into its own!

In the press, in books, on TV and radio, the public is learning more and more about science's never-ending diet discoveries... finding out that nutritional value is the key to wise food buying.

Now more than ever it will pay you—in increased sales—to carefully consider the vitamin fortification or enrichment of your food and beverage products.

Pfizer, with over 18 years' experience in vitamin production and research, has accumulated much valuable data on food fortification and enrichment. Why not take advantage of this background? Write for the booklet, "Pfizer Products for Food Fortification," for complete information on Vitamin A, Thiamine, Riboflavin, Niacin, Vitamin B_{12}, Vitamin C (Ascorbic Acid).

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Pioneer and Leading Manufacturer of Vitamins Pfizer

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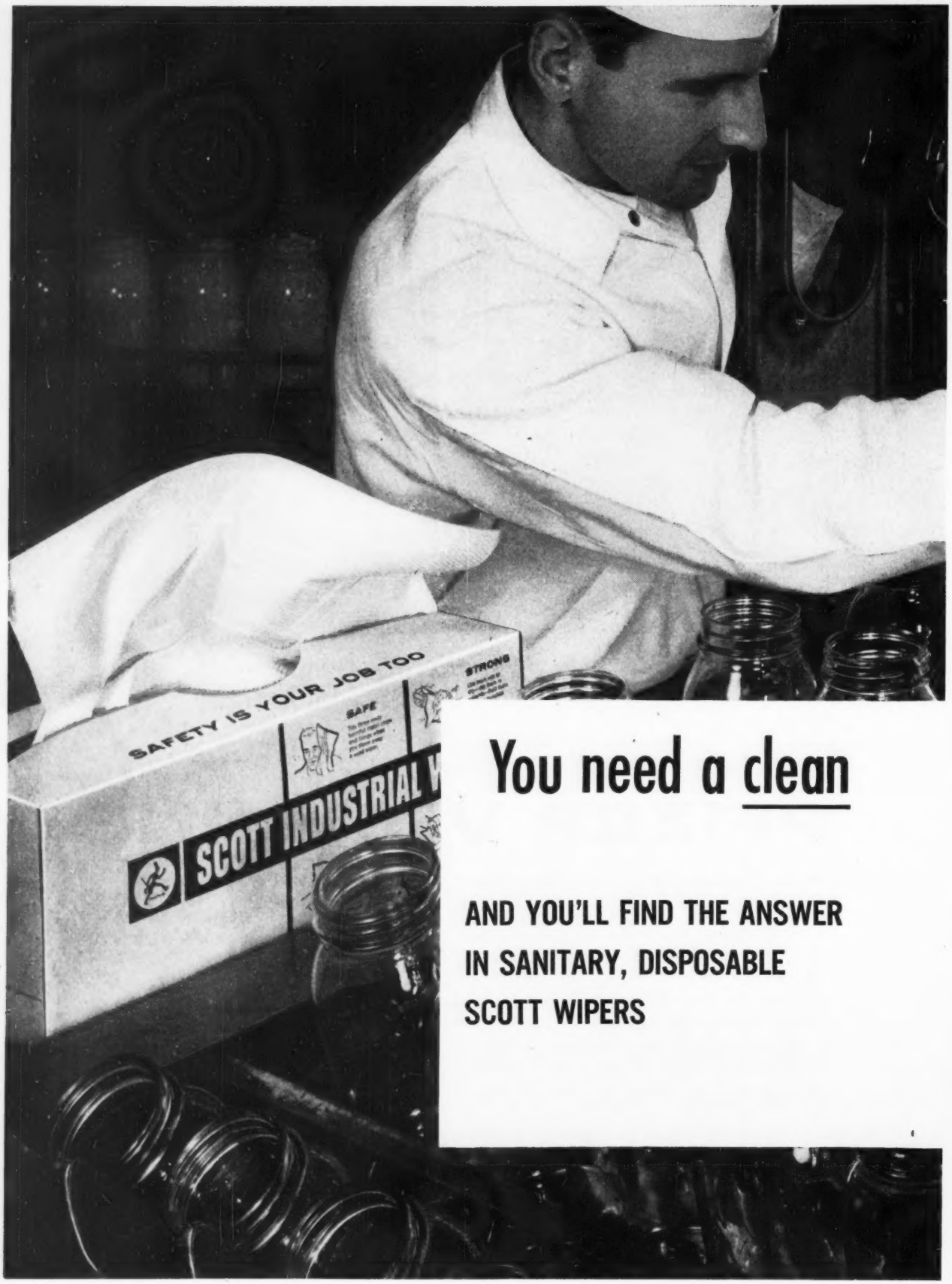


You need a clean

AND YOU'LL FIND THE ANSWER IN SANITARY, DISPOSABLE SCOTT WIPERS

wiper around food and candy!

Use one thoroughly, throw it away—a clean Scott Wiper is there to take over.

You'll use them to wipe up food spillage . . . to wipe down food vats . . . to take care of the wiping needs in all departments.

Scott Wipers are packed 125 to the box. They're two-ply and tough, yet soft and absorbent. Compare them with whatever wiping material you're using now—for cost, for convenience, for performance.

The Scott representative or distributor in your area will be glad to help you set up a production-line demonstration in your plant. Call him or mail this coupon today.

Scott Paper Company, Dept. FE-3, Chester, Pa.
Please send information on Scott Wipers.

Name_____

Company_____

Address_____

City_____ State_____

Make sure the screw conveyors you buy pass this quality test!

If they don't . . . investigate LINK-BELT's sound engineering and quality manufacture . . . your assurance of top performance

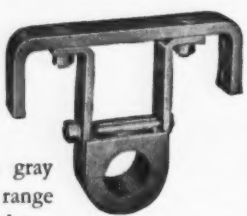
1. Is flighting accurately formed?

Link-Belt's specialized machinery assures accurate forming, producing uniformity of flighting curvature.

2. Are diameters uniform?

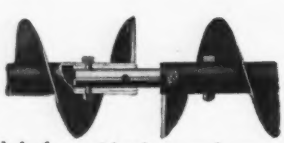
Only specially selected steels are used to meet Link-Belt's rigid specifications.

3. Will the hangers match your exact needs?



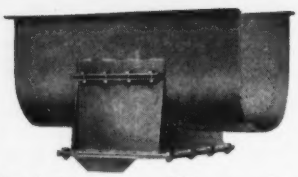
Hangers are available in gray iron or steel frames in a range of styles and with various bearing materials.

4. Will installation be easy?



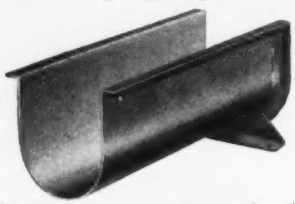
Straightness is checked before shipping, and extra care is taken in handling and loading. Jig-drilled coupling bolt holes facilitate assembly.

5. Can gates be installed on the job?



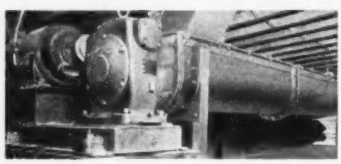
Gates are available for bolting or welding in place right on the job for ease of trough opening location.

6. Are troughs fabricated to your specifications?



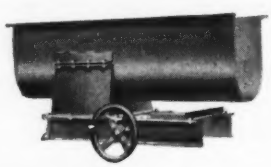
Link-Belt's accurate fabrication assures better fit of all components. Choice of metals to fit your need.

7. Is the drive fully integrated?



Only Link-Belt builds a complete line of gear and chain drives, couplings, bearings, shafting.

8. How wide a choice of spouts and gates do you have?



Discharge spouts and gates can be fixed or detachable. Hand or rack-and-pinion, flat or curved slide gates.

9. Is full ordering information readily available?

Link-Belt's 92-page Screw Conveyor Book 2289 contains complete ordering data. Ask your Link-Belt representative or distributor for your copy today.

LINK-BELT

13,828 **SCREW CONVEYORS**

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Sealva*

THE NEW HERMETICALLY SEALED **FLAVORS**

Success

The unusual success of the remarkable SEALVA* process is attested to by its wide acceptance in almost every branch of the food field. Already SEALVA flavors are being used in commercial production in—

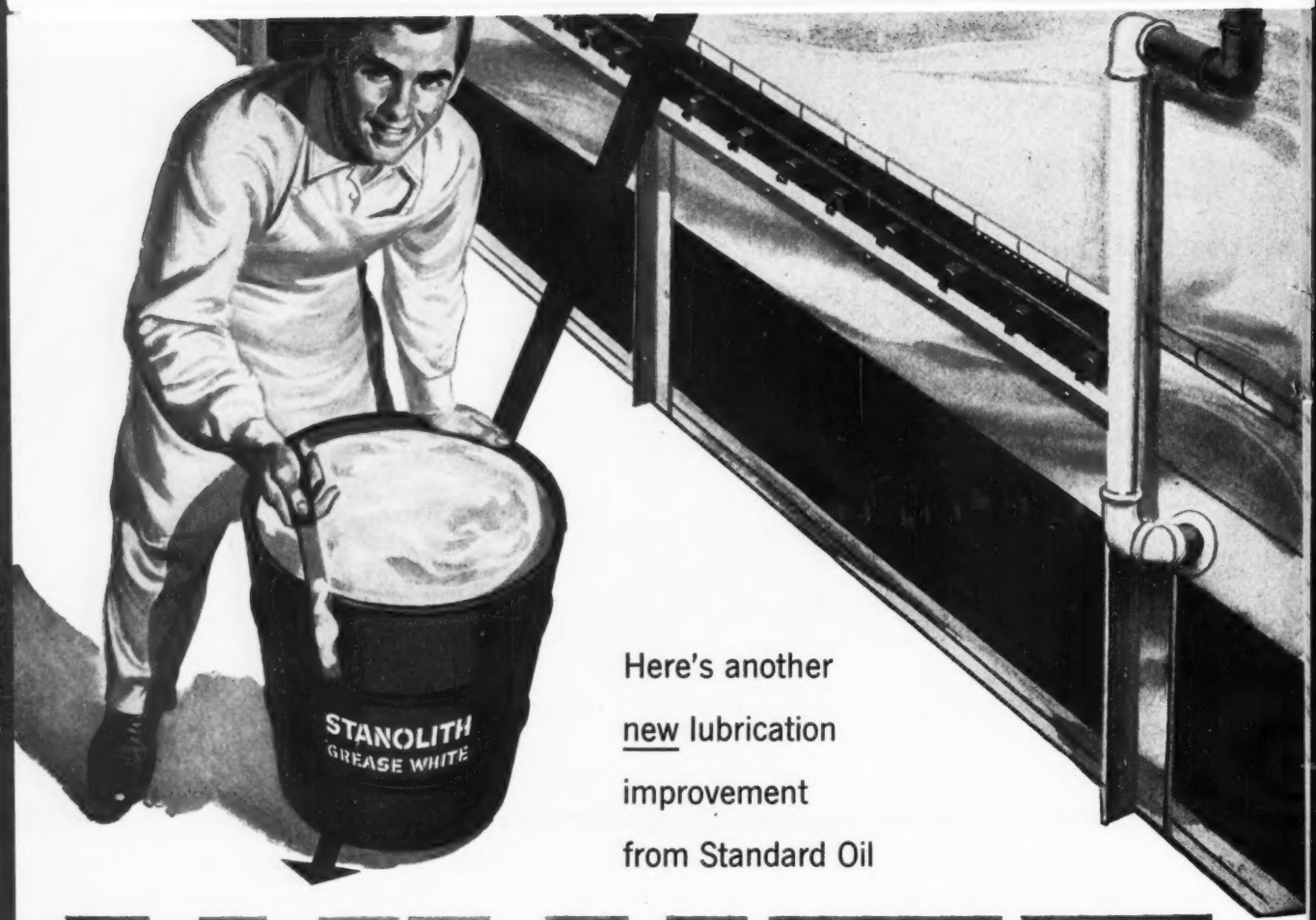
- **Pie Fillings**
- **Cake Mixes**
- **Cake Icing Mixes**
- **Pudding Powders**
- **Gelatin Desserts**
- **Ice Cream & Sherbet Mixes**
- **Confectionery Cream Centers**
- **Pressed Wafers**
- **Chewing Gum**
- **Pharmaceuticals**
- **Summer Drink Powders**

SEALVA flavors can undoubtedly improve the taste and acceptance of your product. Samples and technical data at your request.

VAN AMERINGEN-HAEBLER, INC.
521 WEST 57th STREET • NEW YORK 19, N. Y.

Alva FLAVORS

* The SEALVA process is a method whereby minute droplets of flavor oils are sealed against the ravages of atmosphere and shelf-life within an impermeable membrane of edible gum. The flavor contained in this dry powdered form is released instantly in the mouth or in liquids.



Here's another
new lubrication
improvement
from Standard Oil

WHITE

NEW STANOLITH GREASE

A new grease! White and clean in appearance, STANOLITH Grease White is the perfect grease for use in food and beverage plants.

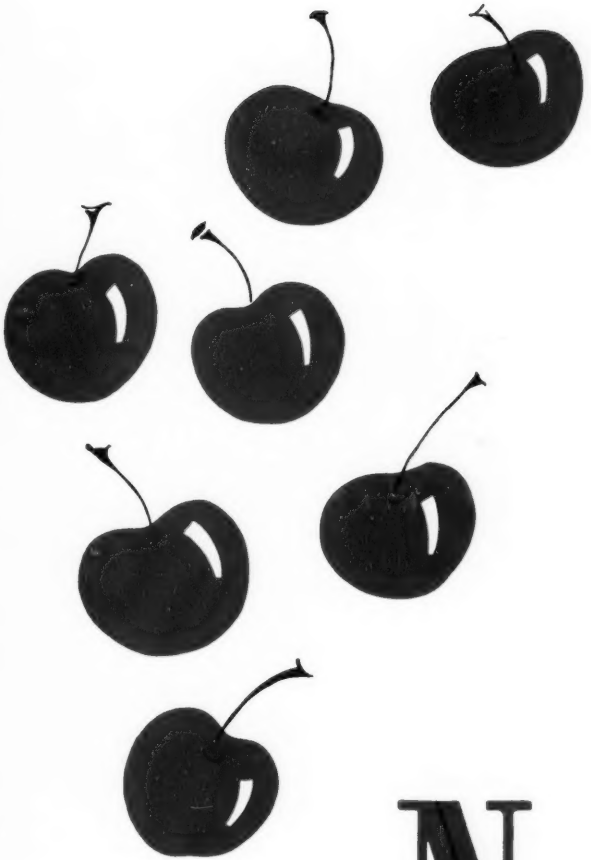
Specially recommended for bakeries, breweries, candy factories, canning and cereal plants, chemical processing plants, dairies, distilleries, meat processors — all industries where clean, sanitary operating conditions are at a premium.

● STANOLITH Grease White is a new high quality, multi-purpose lithium soap grease with a clean, white color. It assures you of unmatched lubricating cleanliness *plus* unmatched lubricating efficiency.

In addition to the high-temperature and water resistant properties, characteristic of most lithium greases, STANOLITH Grease White has superior mechanical and chemical stability. It provides a water-resistant lubricating film that gives this remarkable grease extended multi-purpose usage in a wide variety of applications. Easily handled in all usual types of grease-dispensing equipment, it is safe, easy-to-use, clean. Call your nearby Standard Oil lubrication specialist for full details on new STANOLITH Grease White.

STANDARD OIL COMPANY *(Indiana)*

STANDARD



A little color
adds a lot of
appetite-appeal

National

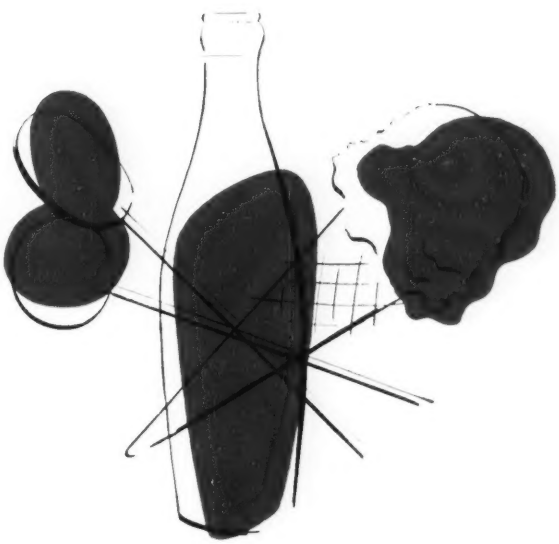
CERTIFIED

FOOD COLORS

Wholesome foods and beverages become doubly pleasurable with just a tinge of color to emphasize inherent goodness. No other ingredient adds so much for so little ... in making good food more enjoyable.

Conscious of our responsibility to you and to your customers, we have always gone well beyond the minimum necessities of certification to make National Food Colors the industry's standard of excellence. These colors are distinguished for uniformity of pure-dye strength, shade and composition.

Fine foods deserve fine colors. To be sure, always specify National Food Colors.

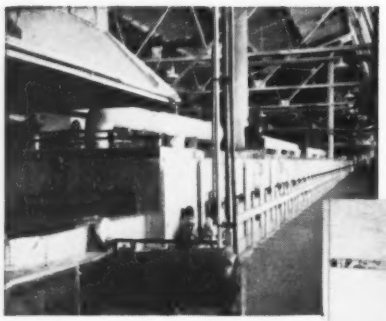


CERTIFIED COLOR DIVISION

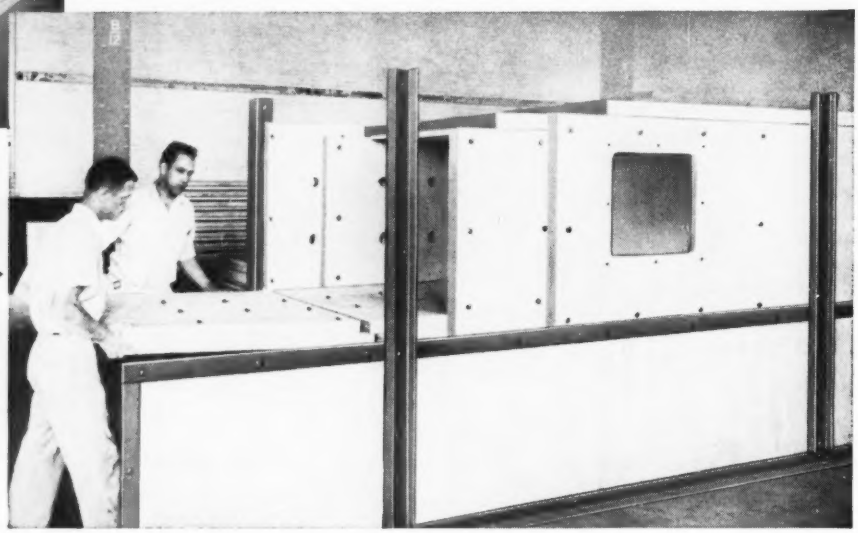
NATIONAL ANILINE DIVISION ALLIED CHEMICAL & DYE CORPORATION • 40 RECTOR ST., NEW YORK 6, N. Y.

Boston Charlotte Chicago Philadelphia Portland, Ore. San Francisco Toronto

Allied Chemical



Typical band oven built with Marinite insulation. Insulation engineering by Johns-Manville.



Mechanics assembling a Marinite bakery oven. Marinite is used both as the structural and insulating material.

Modern bakery band ovens are *Built* and *Insulated* with one material . . . J-M MARINITE

When leaders in the baking industry look for ways to improve band-oven performance, they realize that efficient insulation is a primary requirement. Johns-Manville provides the answer to this need with J-M Marinite*, the *structural* insulating material. Marinite improves band-oven performance in three important ways:

1. Cuts fuel bills—because it is an efficient thermal insulation . . . heat loss through Marinite oven walls is very slight. Fuel savings are substantial, for ovens of this type operate 24 hours a day, at temperatures up to 700F.

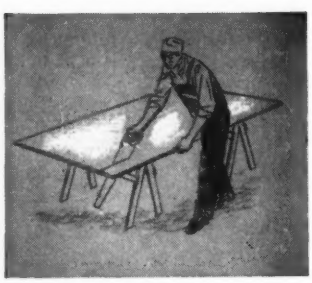
2. Improves temperature control—because it eliminates almost all through-metal fasteners and reduces the need for structural supports. Marinite construction provides uniform temperatures throughout the oven without local hot spots.

3. Reduces maintenance—because it is entirely unaffected by the high humidity and corrosive organic gases commonly prevalent in band ovens. Installation costs are also lower than with former methods of construction.

The Marinite oven installation illustrated here is but one example of how Johns-Manville insulating materials and Johns-Manville insulation engineering services are teamed with industry to develop improved processes and more efficient equipment. If you would like more information about Marinite Insulation and its application to your product or plant equipment, write Johns-Manville, Box 60, New York 16, New York. In Canada, 199 Bay Street, Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

*Reg. U. S. Pat. Off.



Marinite is an asbestos insulating material that combines great structural strength and excellent thermal characteristics. It is durable . . . proved in years of field experience. It is workable . . . can be fabricated with woodworking tools . . . can be cut, punched, shaped to fit. Also available fabricated to your specifications, ready to assemble.

Johns-Manville *FIRST IN* INSULATION

MATERIALS • ENGINEERING • APPLICATION

Instant Coffee Process

A dependable, fully operating plant . . .
Designed to your specific requirements . . .
Installed complete in every detail (including the training of your personnel . . . Backed by a responsible company with over 25 years experience in specialized food processing . . .

We shall be pleased to discuss the Sharples Instant Coffee Process with you and your associates.

SHARPLES

THE SHARPLES CORPORATION • 2300 WESTMORELAND STREET • PHILADELPHIA 40, PA.
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For more information, use coupon on last page.

How WHITE TRUCKS help DAN-DEE boost sales...

1920 WHITE Show-Truck attracts crowds...

THIS WHITE Dan-Dee Show-Truck attracts customers wherever it goes. Dan-Dee Pretzel and Potato Chip Co., Cleveland, O., restored this 1920 White panel truck for use in parades, store-openings and special events.

NOW... Faster, More Economical Deliveries by WHITE 3000

And when it comes to product deliveries, Dan-Dee turns to the White 3000 for more sales and faster deliveries. The White 3000, rolling up 80,000 miles a year, boosts payload . . . reduces operating cost . . . has wonderful sales value.

And, says Harry A. Orr, president of Dan-Dee, "We are able to reduce delivery time and improve delivery efficiency because of the 3 feet of additional trailer space permitted."

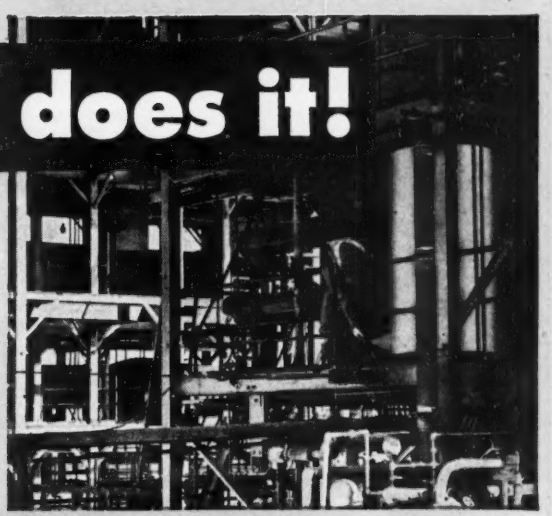
Don't delay finding out about the many exclusive advantages of the White 3000 for your business. See your White Representative today.

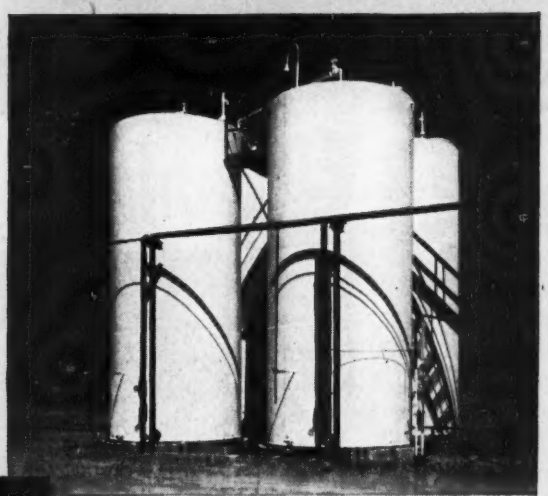
THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS

EPON® RESIN does it!

New paint lasts years ...resists corrosive spillage at Diamond Alkali plant





HERE'S HOW...

PAINT LEADS a hard life at the Diamond Alkali Company agricultural chemicals plant in Houston, Texas . . . and no ordinary paint can survive there for long!

A few reasons for paint failure: Processing vessels and storage tanks are subjected to spillage of chlorinated hydrocarbons and benzene, and some also to heat. In parts of the plant, painted surfaces are exposed to the highly corrosive fumes of hydrogen chloride and sulfuric acid.

In their search to find a tougher, longer lasting paint, Diamond Alkali maintenance men tried coatings of many types, including heavy duty maintenance finishes. Some "washed off" immediately; some lasted 6 to 8 months. Finally, Epon resin coatings based on the XA-200 formulation were tried — and found outstandingly successful.

The Epon cold-cured paint, applied by spraying throughout the entire plant, has been in service for *more than two years with no failure.* Painting costs — for both material and labor—are a mere fraction of what they formerly were, reports Diamond Alkali.

Call on our sales offices for names of suppliers who sell Epon resin coatings for your needs. Write for the full Epon coatings story in the new brochure, *"Planning to Paint a Pyramid?"*

SHELL CHEMICAL CORPORATION

Chemical Partner of Industry and Agriculture

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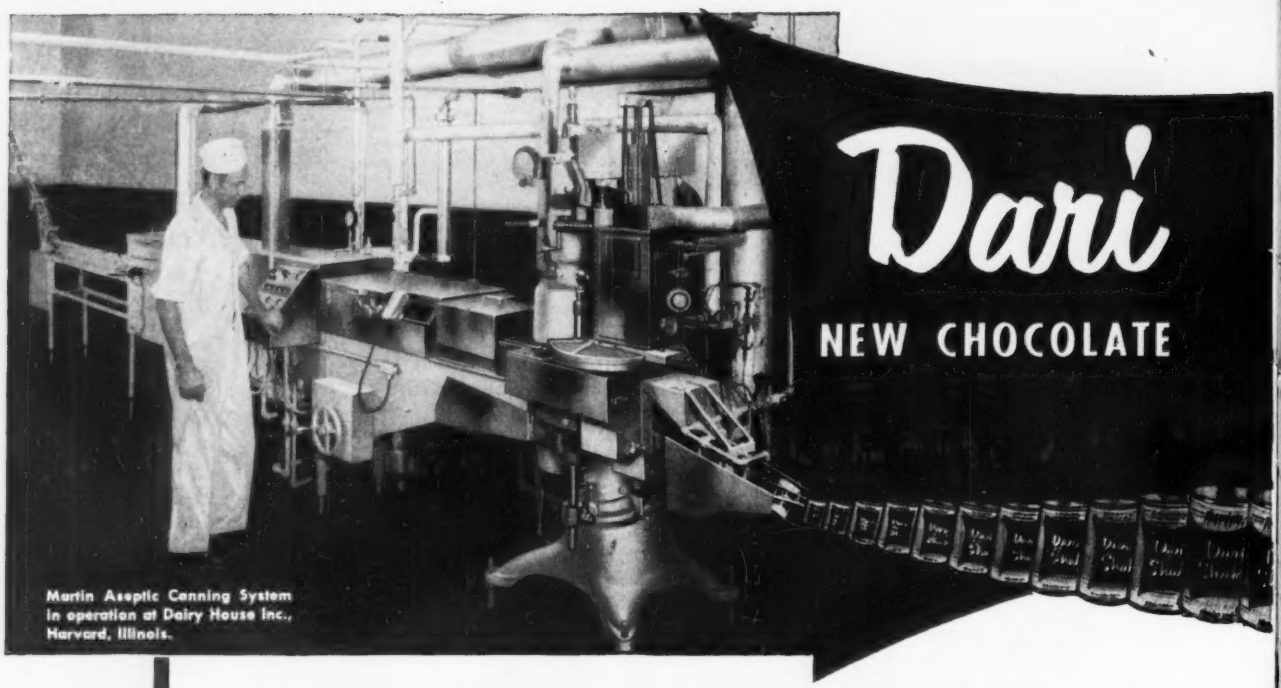
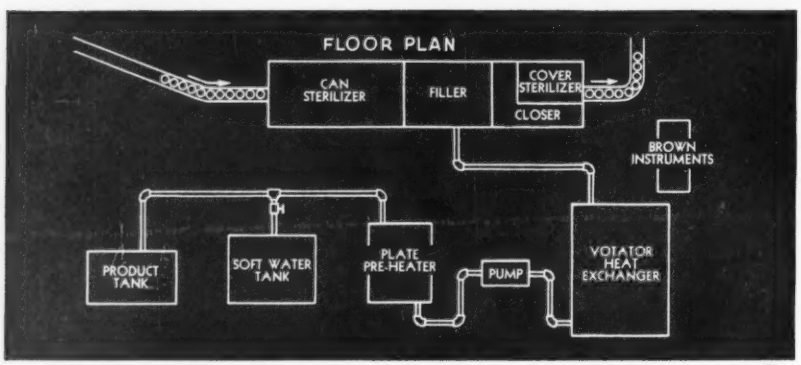


Martin Aseptic Canning System in operation at Dairy House Inc., Harvard, Illinois.

NOW PROCESSED WITH



Floor plan showing arrangement of Martin Aseptic Canning System . . . a continuous canning process that automatically fills and seals sterile products in sterile containers in a sterile atmosphere.

W. F. & John Barnes are Exclusive Sales and Service Representatives for the James Dole Engineering Co., Manufacturers of the Martin Aseptic Canning System

W.F.& JOHN BARNES

W. F. & JOHN BARNES COMPANY

PROCESS EQUIPMENT DIVISION

303 SOUTH WATER STREET • ROCKFORD, ILLINOIS

***West Coast Representative* BARMOTIVE PRODUCTS, Inc.**

440 Peralta Avenue, San Leandro, California, *Technical Sales and Service*

BUILDERS OF BETTER MACHINES

MARTIN ASEPTIC CANNING SYSTEM

At Dairy House Inc., a subsidiary of the Bowman Dairy Company and Bowey's Inc., the Martin Aseptic Canning System is today processing Dari Shake, a delicious chocolate drink, with all the original flavor, color, texture, and nutritive value preserved. Previously, Dari Shake, one of a number of heat sensitive products, could not be canned by conventional methods. Now, with the Martin Aseptic Canning System, tests by Dairy House technologists have proven that the uniformity, flavor, and stability of the chocolate drink is excellent. The Model 60 Martin Aseptic Canning System, illustrated at left, produces 35,000, 8-oz. cans of Dari Shake on a typical 10-hour production run.

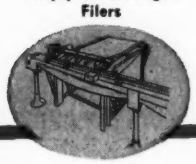
A Continuous Canning Process

In operation, the chocolate drink is quickly heated to a temperature of 290° F., held for a few seconds to insure sterility, and is rapidly cooled to 40° F. in a closed heat exchange system. The cans are sterilized in the Martin Unit and then conveyed through the can sterilizer to the filler, ready to receive the cold sterile product. After the cans are filled, they are conveyed in a sterile atmosphere to a closing machine where they receive sterile covers from the cover sterilizer. A slight positive pressure is maintained in the Martin Equipment so that outward flow of sterile gases acts as an efficient contamination barrier. The Martin Aseptic Canning System has now been in operation at Dairy House since 1951 with excellent results. For one 3-month period, it was kept running on a production basis of 24 hours a day, 7 days a week . . . further proof of the dependability of the Martin Aseptic Canning System.

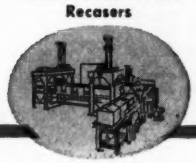
ADDITIONAL DATA

New brochure describes in detail the advantages of canning with the Martin Aseptic Canning System. The Martin System is available in 5 sizes with capacities up to 300 consumer-size cans per minute. Write for your free copy today.

Empty Glass Single Filers



Carton Uncasers and Recasers

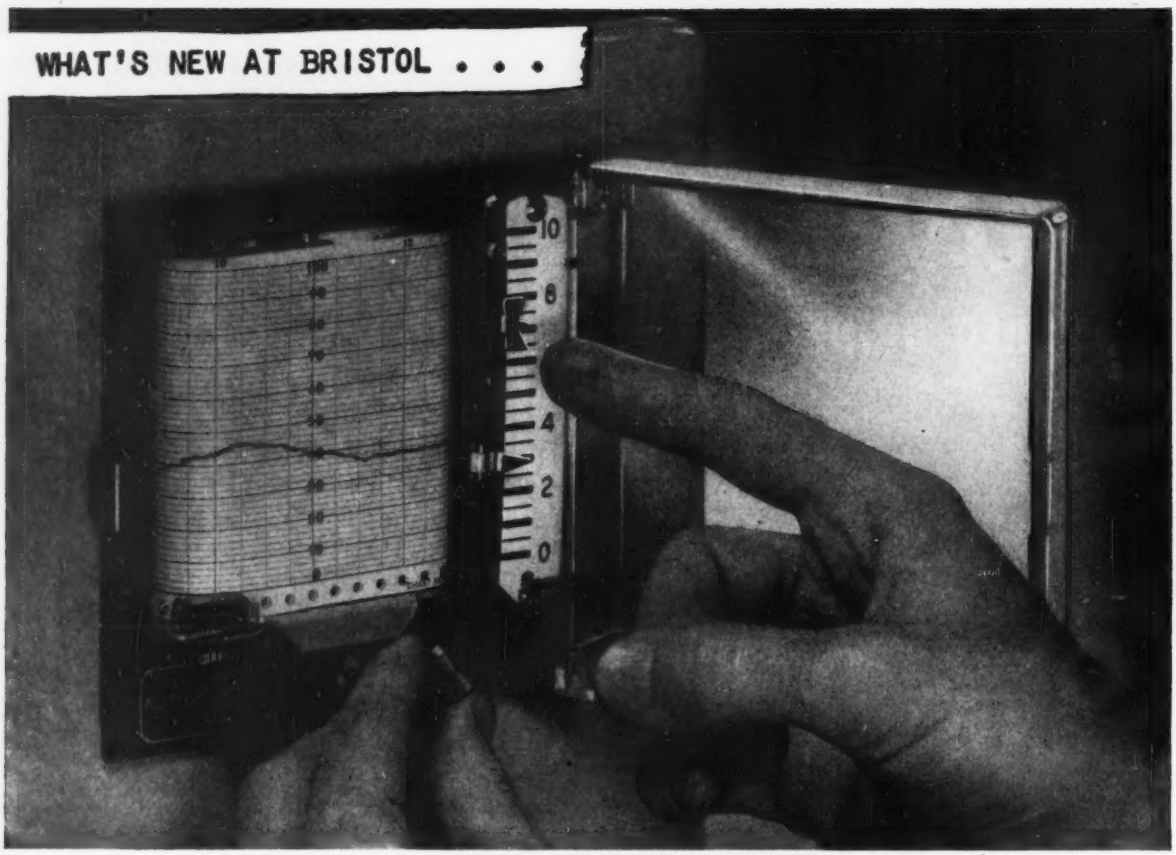


Retort Basket Loaders and Unloaders

Special Conveyors and Elevators

AND EQUIPMENT SINCE 1872

For more information, use coupon on last page.



BRISTOL'S "HUMAN-ENGINEERED" METAGRAPHIC RECORDER, with its easy-to-read scale, high-visibility fluorescent pointers and shadow-proof door has earned the distinction of being the "biggest little instrument in the business."

Instrument men call Bristol's METAGRAPHIC Recorder

"... the biggest little instrument"

Sounds contradictory, but it's true. Take a look at one of our new METAGRAPHICS mounted on a panel board alongside of other instruments. The Bristol unit stands out – seems bigger than the rest – although chances are it's actually smaller (5" x 5½"). The answer is that the Bristol instruments have been "human-engineered", making them easy to read, and clearly visible at greater distances.

The air-operated METAGRAPHIC, which records pressure, temperature, vacuum, flow, differential pressure, and liquid level, offers these big advantages:

SIMPLICITY . . . fewer moving parts, fewer adjustments, and less service required. Range changes can be made in seconds. True plug-in service.

CONTINUOUS VALVE-POSITION INDICATION . . . on same instrument scale as set-point scale, gives continuous data on control valve position—makes "bumpless" transfer possible simply by matching pointer positions – no need to read actual scale values – minimizes reading errors – speeds operations.

CONTINUOUS OPERATION . . . complete unit can be retracted for inking pen, and for set-point and zero adjustment without disturbing record or control.

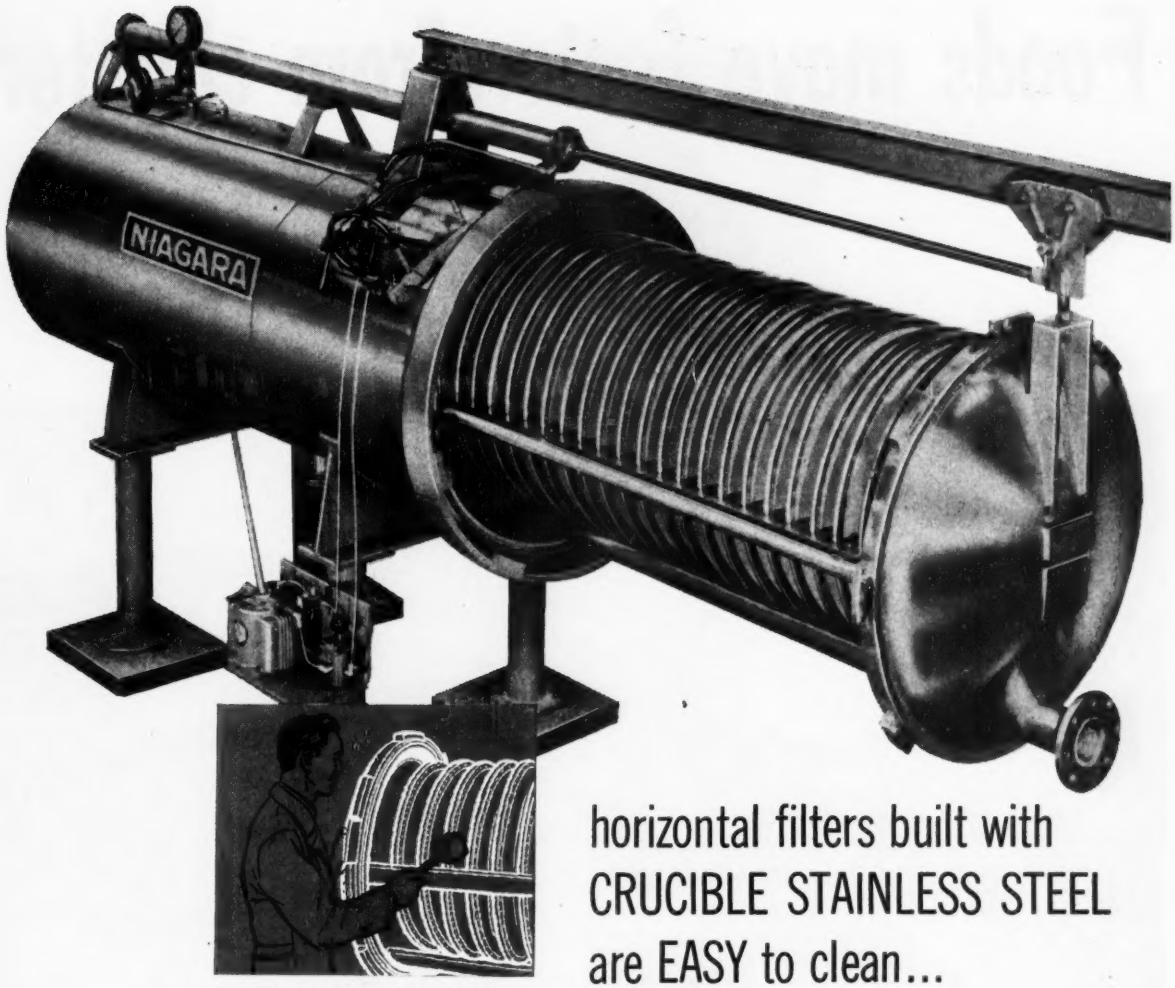
Get the whole story on the "human-engineered" METAGRAPHICS – how they can help you get more accurate measurements, faster and easier. Write us today. The Bristol Company, 115 Bristol Road, Waterbury 20, Conn.

BRISTOL

POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

6.4.4R

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS



Crucible stainless steel, used by American Machine & Metals, Inc., in the fabrication of Niagara Horizontal pressure leaf Filters, assures ease of cleaning, long service life.

horizontal filters built with CRUCIBLE STAINLESS STEEL are EASY to clean... HARD to wear out

When solids have to be separated from liquids . . . when semidry cakes must be dislodged quickly and easily . . . and where minimum down time is vital—there's no unit like a horizontal pressure leaf filter. And when its materials must be strong enough to take rugged, continuous use without undue wear—there's no material like Crucible Rezistal® stainless steel.

In operation, horizontal filters like the one shown here, are cleaned by rolling out the leaves, and tapping with a rubber hammer. Crucible stainless leaves require no cloths—and seldom *or never* need to be replaced.

The story's the same with any process equipment. When you're choosing equipment that must stand up under heavy production schedules—take advantage of the proved reliability of Crucible stainless steel. Remember, too—Crucible . . . the world's leading producer of special purpose steels . . . is always ready to help you plan for new and different applications of stainless. So, for help of any kind—*call Crucible.*

Get this new 44-page Crucible book, "Making the Most of Stainless Steels in the Chemical Process Industries." It's full of information you'll be able to use in your daily work. Write today for your copy.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **STAINLESS STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

For more information, use coupon on last page.

Foods move faster from counter

when MSG*

Payoff on processed food sales comes when shoppers reach for one brand instead of another. Make sure it's yours by using Huron MSG.

Frozen foods – chicken pies, fish, meat, poultry, and vegetables — retain their pre-freezing flavor longer when you use Huron MSG. In many cases it also helps preserve their original color.

Canned foods – soups, gravies, hash, beans and others — keep their original flavor through all three cookings (yours plus the housewife's) with Huron MSG (made *only* from wheat protein).

Huron MSG

PURE MONOSODIUM GLUTAMATE 99+%

Made by the American pioneers in protein derivatives

to table...

is on the label

Small fry make a big difference in selling food.

In the shoppers' home, your product has nothing more or less than its own flavor to stand or fall on. If it passes this critical taste test, it rates a permanent place on the family shopping list.

That's why so many processors "insure" taste appeal with Huron MSG — America's first MSG and still the quality standard. You can be next. Huron Milling Co., 9 Park Place, New York 7, N.Y.

For suggestions and sample, write Huron's Technical Service Department

B.4.1

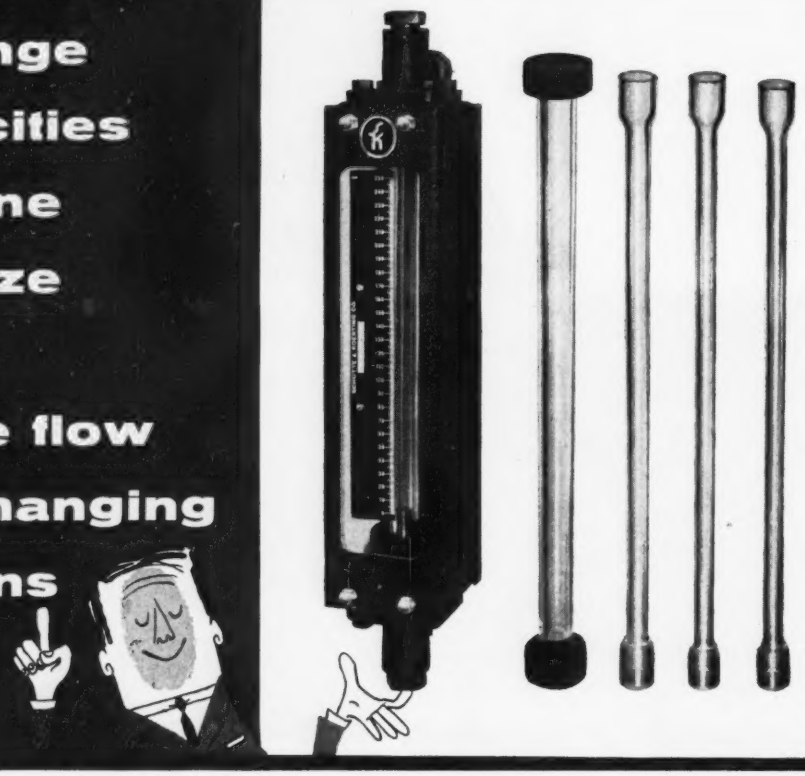
* Huron MSG, of course!

SALES OFFICES: 161 E. Grand Avenue, Chicago 11 • 13 E. Eighth Street, Cincinnati 2 • 383 Brannan Street, San Francisco 7
FACTORIES: Harbor Beach, Michigan

For more information, use coupon on last page.

The versatile **ROTAMETER** for continuous or batch processing

wide range of capacities within one meter size lets you measure flow under changing conditions



Ever wish for a *versatile* meter? One that adapts *in minutes* to changing rates of flow? You get your wish *with the SK Safeguard Rotameter because . . .*

. . . *Four Sizes of Tubes,* each offering a different capacity, can be used in a single Rotameter.

. . . *Tubes Interchange Quickly*—can be removed and replaced to meet changing conditions.

. . . *Exclusive Belled Ends* of tubes, all having same inlet and outlet OD, permit standardization of end fittings and packings. No special tools or fittings needed.

. . . *Numerous Rotor Designs* can be used within one meter tube to provide wide range of capacities.

Where flow rates change frequently, as in proportioning dissimilar fluids, you'll find the *SK Safeguard Rotameter* outstandingly convenient and economical. Accurate, durable and safe, too, because . . .

. . . Meter Case of Strong, Rigid Steel completely encloses tube—protecting against external shock, acting as a safeguard should tube break accidentally.

. . . Heavy Gauge, Safety Glass Windows provide excellent view of tube, rotor and scale.

. . . Detachable Metal Reference Scale is clearly marked for easy reading—can be supplied in units of flow, or in millimeters for use with calibration charts.

. . . Bronze, Cast Iron or Stainless End Fittings are designed to permit connection to piping in any of four horizontal positions.

. . . Non-leaking, Seated, Clean Out Plugs at top and bottom of end fitting permit rotor removal and tube cleaning without disassembly.

. . . Packing Glands are adjustable from outside of case by means of stainless steel capscrews.

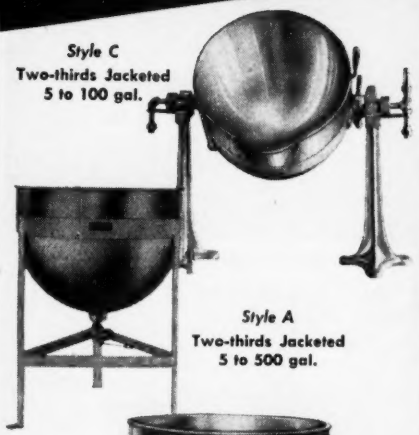
Get Your Free Copy of Bulletin 18-RG. It details operating principles, sizes and dimensions, construction features of SK's Safeguard Rotameter. Yours without obligation.

Schutte and Koerting COMPANY
MANUFACTURING ENGINEERS

2223 STATE ROAD, CORNWELLS HEIGHTS, BUCKS COUNTY, PA.

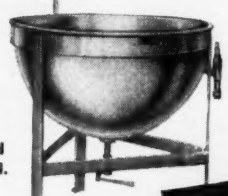
Jet Apparatus • Heat Transfer Equipment
Strainers • Condensers and Vacuum Pumps
Oil Burning Equipment • Rotameters
Flow Indicators • Radiafin Tubes • Valves
Spray Nozzles and Atomizers • Gear Pumps
Desuperheaters

COOKING KETTLES



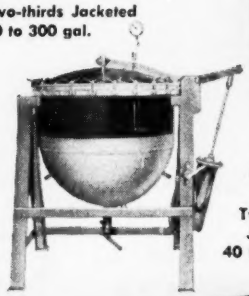
Style C
Two-thirds Jacketed
5 to 100 gal.

Style A
Two-thirds Jacketed
5 to 500 gal.



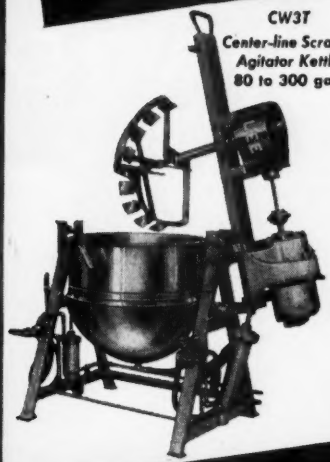
Style B
Full Jacketed
10 to 300 gal.

Style CW
Two-thirds Jacketed
80 to 300 gal.

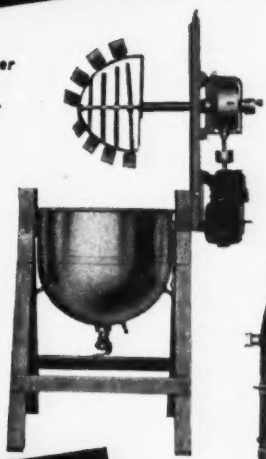


Pressure Kettle
Two-thirds Jacketed
40 to 200 gal.

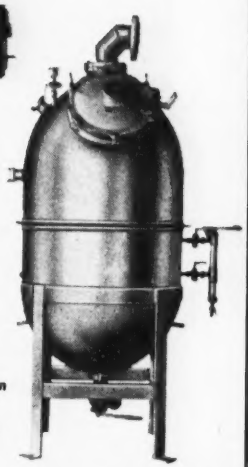
MIXING AND BLENDING UNITS



CW3T
Center-line Scraper Agitator Kettle
80 to 300 gal.



A3T
Center-line Scraper Agitator Kettle
25 to 300 gal.



Vacuum Pan
50 to 500 gal.

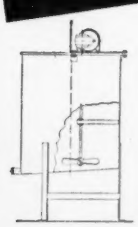
these LEE Units WILL REDUCE YOUR PROCESSING COSTS!

Quick Cooling Pan
50 to 200 gal.

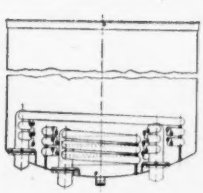
Individually designed for a specific processing operation and available in a wide range of sizes to fit your exacting requirements, Lee corrosion-resistant equipment is built to give you long years of peak performance with minimum maintenance.

Descriptive bulletins are available for any or all of the above units. Write for them today and discover how Lee can help reduce *your* processing costs.

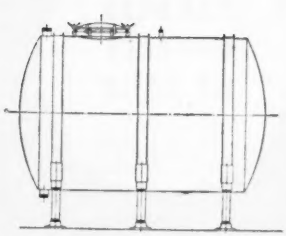
MIXING, COOKING & STORAGE TANKS



Mixing Tank
25 to 500 gal.



Pulp Tank
500 to 2,000 gal.

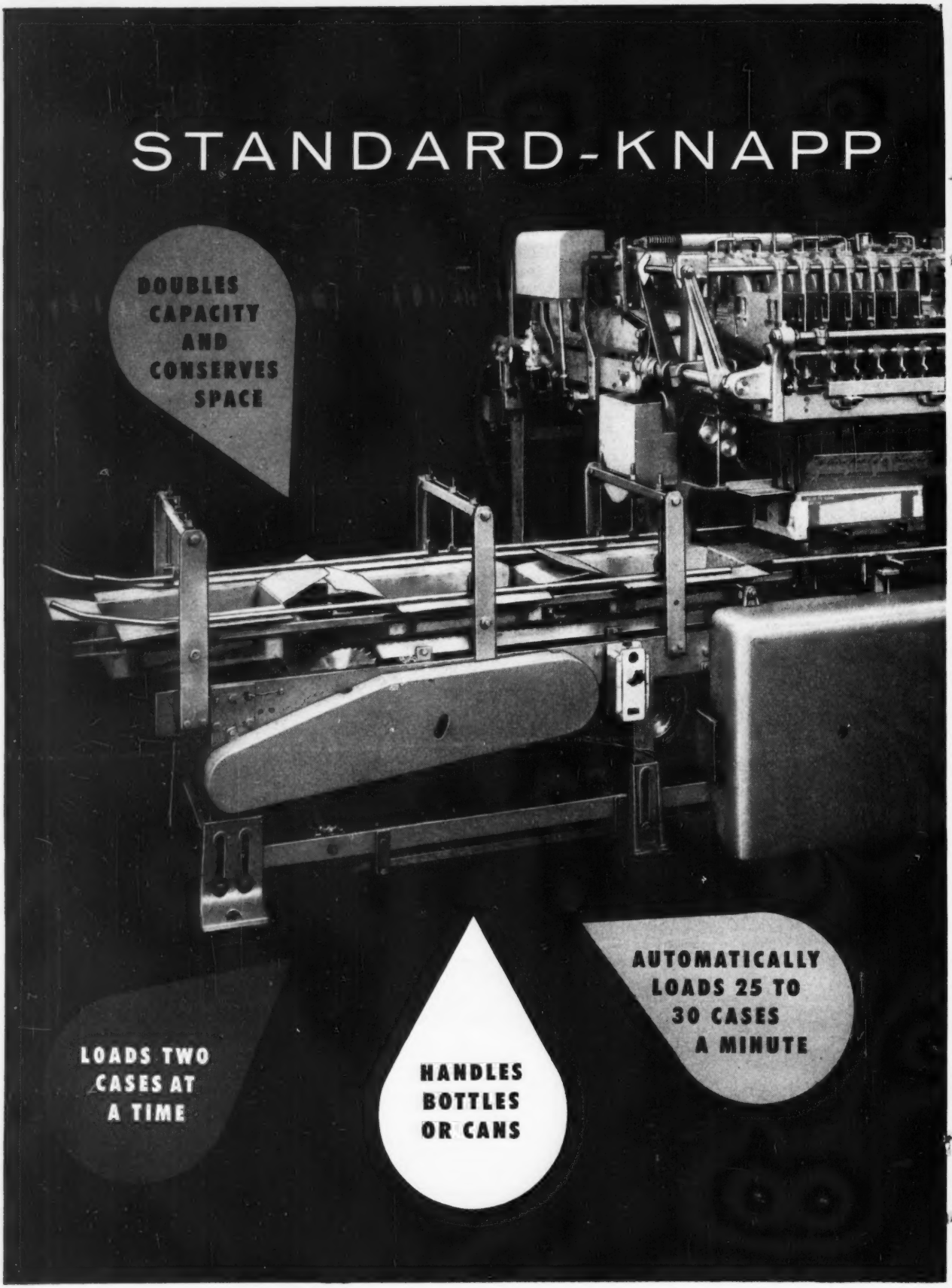


Storage Tank
100 to 5,000 gal.

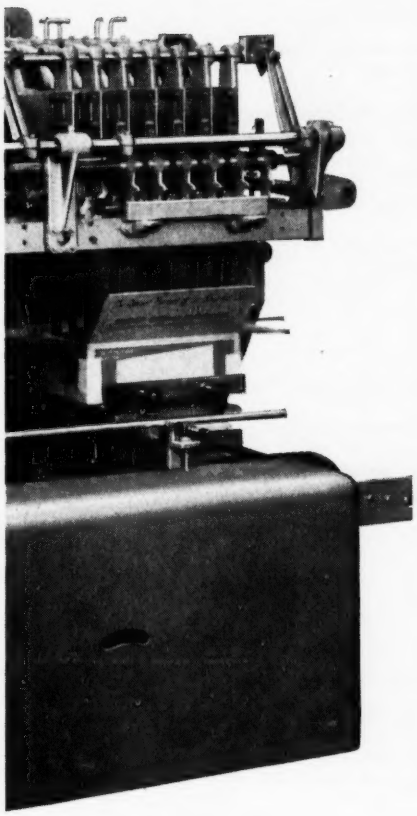
LEE METAL PRODUCTS CO., INC.

416 PINE STREET, PHILIPSBURG, PA.

ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE


STANDARD-KNAPP
DOUBLES CAPACITY AND CONSERVES SPACE
AUTOMATICALLY LOADS 25 TO 30 CASES A MINUTE
LOADS TWO CASES AT A TIME
HANDLES BOTTLES OR CANS

DUPLEX PACKER



You don't have to push out a wall, build an addition or crowd aisles to get more capacity. The DUPLEX (model 830) loads twice as many cases a minute as a standard unit, but uses only a single conveyor for case intake and discharge. It's designed to double capacity in a minimum amount of space.

The DUPLEX will case up to #10 size can; and bottles from 8 oz. to 32 oz. Its amazing speed of 720 containers a minute is coupled with smooth and gentle handling. Bottles are not damaged, cans are not dented. You can count on dependability, top performance at peak production periods and a minimum of downtime.

To pack more profit into every case, get full details on the MODEL 830 DUPLEX PACKER by writing Dept. F, Standard-Knapp, Division of Emhart Mfg. Co., Portland, Connecticut.

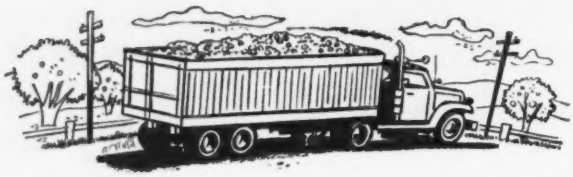
STANDARD-KNAPP

Division of Emhart Mfg. Co.

PORTLAND, CONNECTICUT

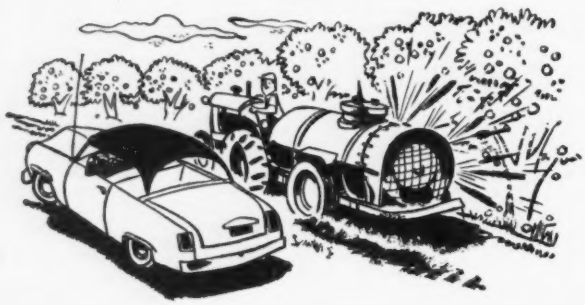
Only the best is good enough

12 REASONS FOR G-E 2-WAY RADIO AND CONSTANT "HOUSE" CONTROL



- Co-ordinate the flow of produce for processing
- Eliminate deadheading . . . obtain payloads every trip
- Gear your picking to "house" capacity perfectly
- Unify all sales, loading and produce operations

- Convert idle hours to picking time
- Re-route crews and equipment
- Control harvested *quantity*—reduce spoilage
- Relay new orders to fields instantly



- Insure top *quality* via contact with field buyers
- Start or stop work in seconds
- Speed vehicle repairs . . . dusting . . . fertilizer etc.
- Know crop maturity virtually as fast as the field does

Actually, there's no limit to the number of ways mobile radio will improve food processing efficiency. You can think of a dozen more than those listed here. And, each can save one or one thousand man-hours . . . a hundred or many hundreds of dollars depending on the size of your operation.

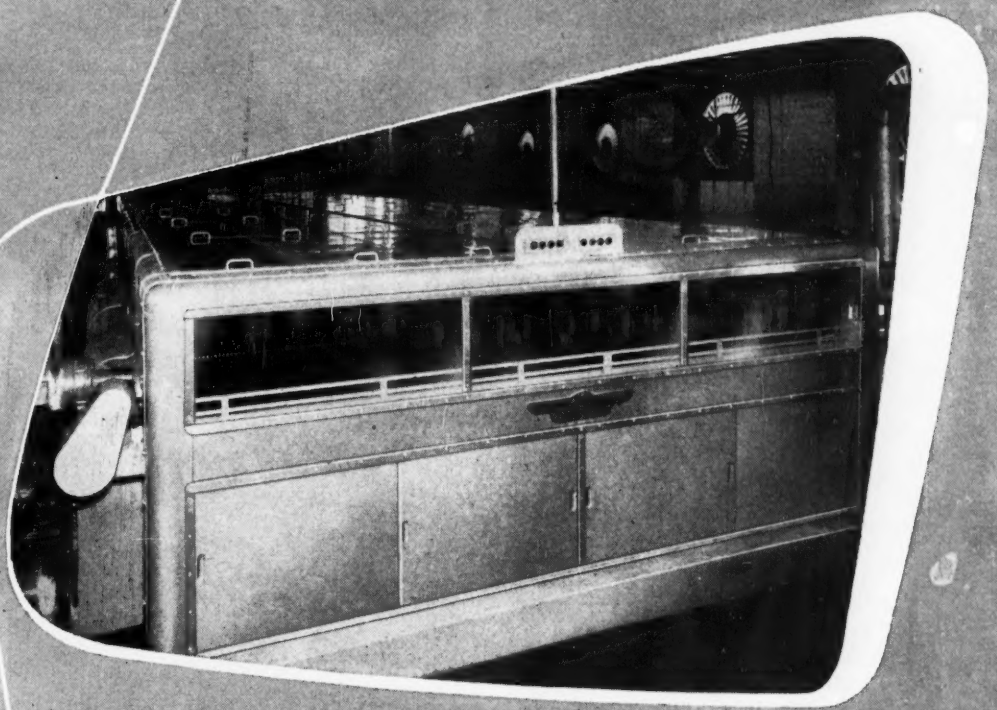
For completely new processing efficiency, see General Electric 2-way radio communications in action. Compare performance . . . compare features of all mobile equipment and watch the points pile up for G.E. A phone call now to our local sales office is the first step . . . the right step toward achieving *constant control.* Or write: *Section X70124, General Electric Company, Electronics Park, Syracuse, N. Y.*

2-WAY MOBILE RADIO

FREQUENCY STABILITY & SELECTIVITY
guaranteed for life!

Progress Is Our Most Important Product

GENERAL ELECTRIC



Processing Fanning's Bread and Butter Pickles

ONLY ...4 MONTHS-A-YEAR..

the B-W VORTEX Pasteurizer Proved PROFITABLE

For The Best Foods Inc.

When The Best Foods Inc., Norfolk, Va., expanded their plant facilities and increased the degree of mechanization, a B-W Vortex Pasteurizer was part of their new production plan. They found the following definite advantages of the Vortex made it a profitable investment:

- Compactness of the Vortex allowed increased expansion without additional building.
- Bottle pre-heating and better automatic control decreased breakage loss and did a more uniform pasteurizing job.
- Absence of steam vapors and heat made for better working conditions.

Mechanization of production facilities—of which the Vortex was a part—saved time and labor, stepped up production. The Best Foods Inc., found their Vortex "walking beam," spray type, automatic pasteurizer profitable, even though run only four months a year.

When *you* consider mechanization for a short season or year 'round operation, it will pay you to get all the facts on the many advantages of the Vortex.

. . What Is Your Problem?

THE SUN NEVER SETS ON B-W BOTTLE CLEANERS PASTEURIZERS & PROCESSORS

BARRY-WEHMILLER MACHINERY CO.

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St. Louis 15, Missouri

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For more information, use coupon on last page.

It's the Nash!

The ability of Nash Compressors to maintain original performance over long periods is no accident. Nash Compressors have but a single moving element, the Nash Rotor. This rotor is precision balanced for long bearing life, and it revolves in the pump casing without metallic contact. Internal lubrication, frequent cause of gas contamination, is not employed in a Nash. Yet, these simple pumps maintain 75 lbs. pressure in a single stage, and afford capacities to 6 million cu. ft. per day in a single compact structure.

Nash Compressors have no valves, gears, pistons, sliding vanes or other enemies of long life. Compression is secured by an entirely different principle of operation, which offers important advantages often the answer to gas handling problems difficult with ordinary equipment.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. Because there are no internal wearing parts, maintenance is low. Service is assured by a nation-wide network of Engineering Service offices. Write for bulletins now.

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature Automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

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while her mind's on her waistline

sell her your own SUCARYL®-sweetened food products

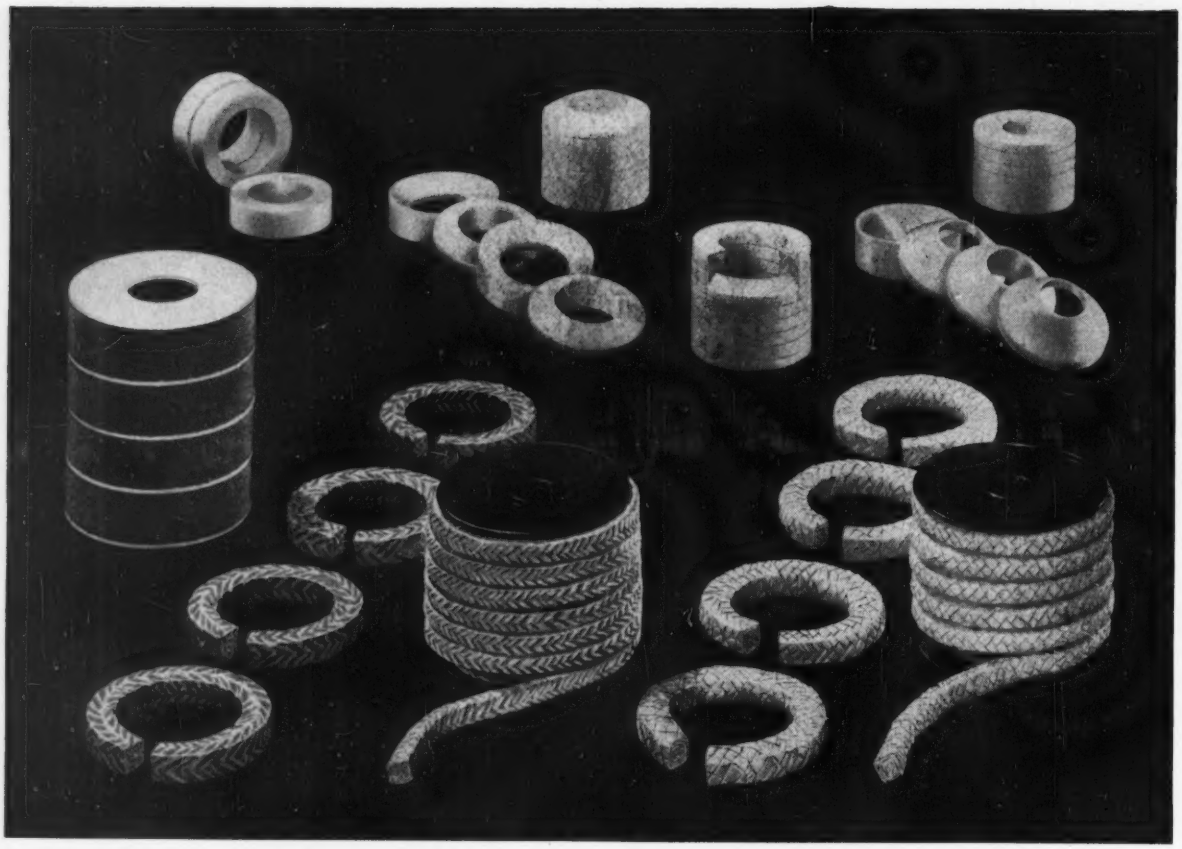
Bathroom scales do a daily job of reminding overweights about SUCARYL—the non-fattening way to satisfy that "sweet-tooth". This means a dietetic market that actually sells itself on buying—day after day!

This is a big market . . . a fast-growing market. More important it is a *pre-sold* market. Most people know about SUCARYL. They'll shop for SUCARYL-sweetened products, they'll pay more for them—and they'll come back for them, week after week.

Have this market shopping for *your* line of non-fattening foods. Right now, timing and public interest are in your favor. Start by getting the facts, *today*. Send for a free copy of "Making the Most of the Dietetic Market with SUCARYL." Write to: Chemical Sales Division, Abbott Laboratories, North Chicago, Ill. Abbott

®Cyclamate, Abbott

For more information, use coupon on last page.



Why R/M Teflon* Packings are so ideal for sealing food processing equipment

Consider first the virtues of "TEFLON": it is non-adhesive and non-contaminating. It shows no reaction against any chemicals which might be used in food processing. It is unaffected by any known industrial acids and caustics; it has no known solvent; its water absorption is zero.

R/M No. 840-W, lower left in the photo above, is an excellent example of the quality of the line. This packing, designed for valve stems, is made of braided asbestos yarns which have been impregnated with "TEFLON." The asbestos in the packing cuts the cost of pure "TEFLON," compensates for thermal expansion, and resists materials handled.

No matter what you are packing—pumps, valves, retorts, hydraulic presses, homogenizers, or what have you—R/M can supply you with the proper packing for the job. The complete R/M "TEFLON" products line includes rods, sheets, tubes, tape, packings, gaskets, rings and irregular shapes. For complete information, see your R/M distributor.

**Du Pont's trade-mark for its tetrafluoroethylene resin*

R/M MAKES A COMPLETE LINE OF PACKINGS AND GASKETS—AVAILABLE FROM YOUR AUTHORIZED R/M DISTRIBUTOR

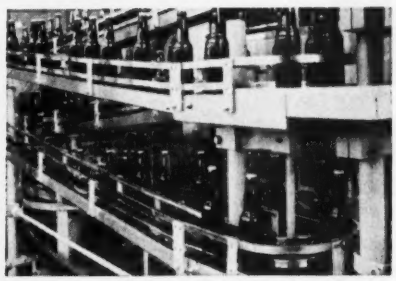
R/M PACKINGS
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville Ind.; Peterborough, Ontario, Canada.

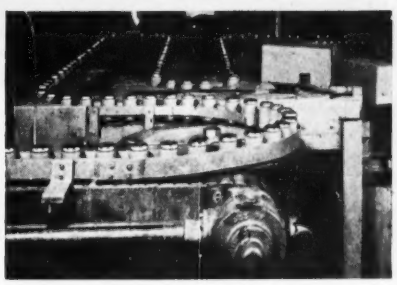
RAYBESTOS-MANHATTAN, INC., Packings • Asbestos Textiles • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Bowling Balls

For smooth, economical conveying--carry it on Link-Belt flat-top chain

EASY-TO-CLEAN Link-Belt S-815 flat-top chain conveyor moves baby food jars smoothly during careful inspection at this Michigan plant.



VERTICAL OR HORIZONTAL CURVES offer no problem for universal crescent flat-top chain.



SMOOTH HANDLING is assured as RC flat-top chain carries jars through filling and capping operations.

Choose from many types of LINK-BELT carrying chain

WHETHER you're handling baby food or beverages—cartons or cans—there's *one* chain in the complete Link-Belt line that will meet your exact needs. The chains pictured above, for example, are only three of many types of Link-Belt flat-top chain.

Link-Belt also builds a variety of cast, combination, forged and fabricated steel chains. They're available with a wide range of attachments for specialized services.

As for drive chain on your food handling machinery, Link-Belt offers an equally broad range of types, including roller and silent chain. High or low speeds . . . heavy shock loads or moderate duty—you'll find the right answer in Link-Belt chain.

There are Link-Belt offices in every principal industrial area. Call the one near you for an impartial analysis of your drive or conveying chain needs.

LINK-BELT

CHAINS and SPROCKETS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13.690

No one chain serves every purpose . . . get the RIGHT one from Link-Belt's complete line

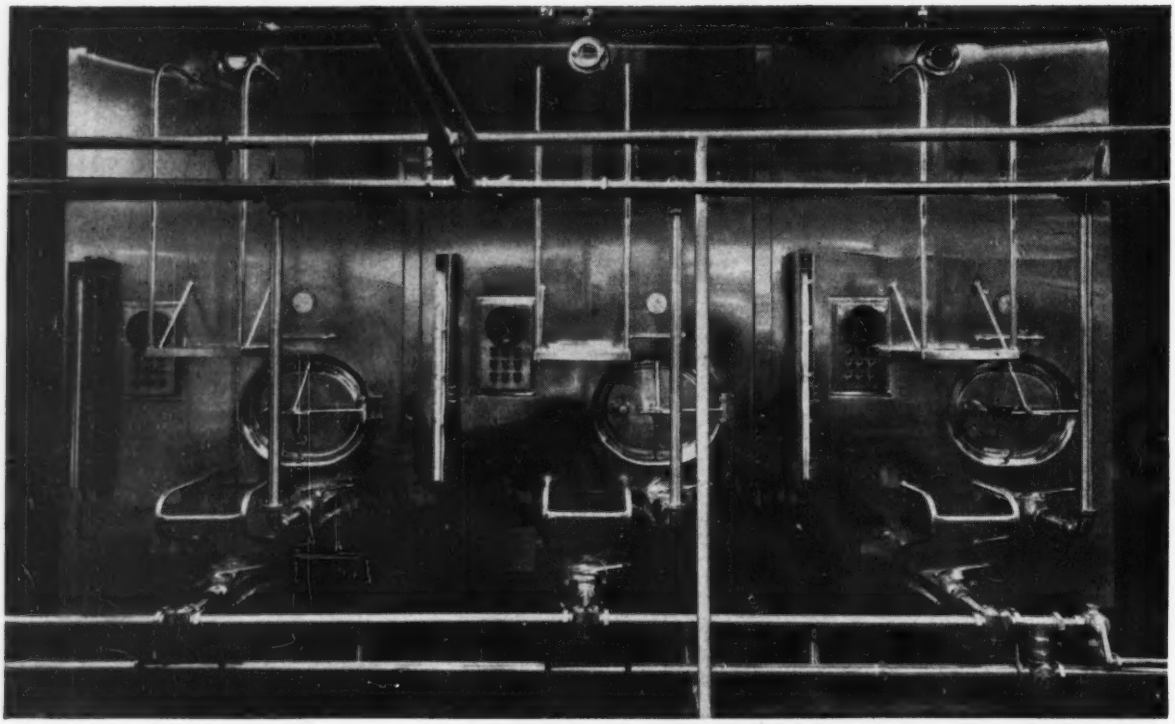
S-815 flat-top conveyor chain—economical, sturdy, reliable, easy to detach and to keep clean.

Class RC universal crescent flat-top chain for multi-plane operation in a variety of paths.

Class RC crescent flat-top chain—travels in horizontal planes and around corners.

Class RC flat-top chain—precision made for smoothest, spill-free carrying and long life.

Class 400 swivel chain—carries cartons, cases, etc. over paths with both vertical and horizontal turns.

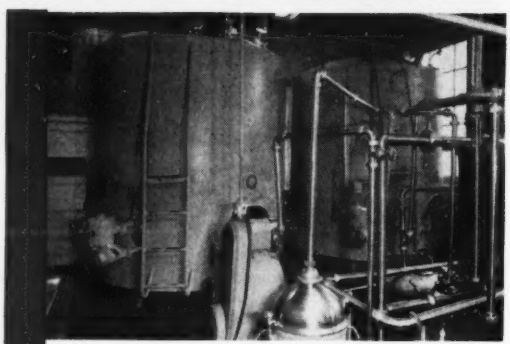


Why CHERRY-BURRELL Storage Tanks are like women!

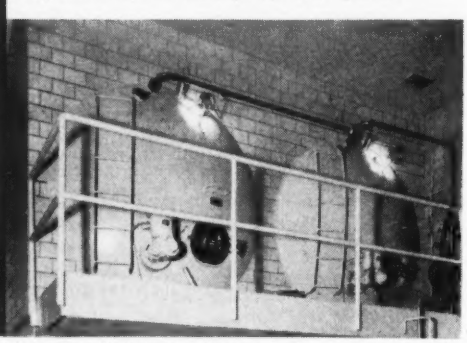
Like women, Cherry-Burrell Stainless Steel Storage Tanks have an endless variety of sizes and shapes; some do more work than others; and, yes, some cost less than others.

The three stainless steel tanks shown above are rectangular, nested side by side to store 8,100 gallons in minimum space. But they don't *have* to be rectangular.

Maybe you'd prefer a 500-gallon horizontal tank, for instance . . . or a 7,000-gallon vertical tank . . . a plain insulated tank or one with Cherry-Burrell's exclusive channel wall surface for cooling. It's up to you. We make 'em to your specs . . . any size . . . any shape . . . for storing or cooling . . . with as many or as few accessories as you wish.



Cherry-Burrell Vertical Storage Tanks at Reuter's Dairy, Evergreen Park, Illinois. Capacity: 2000 gallons.



Cherry-Burrell Horizontal Storage Tanks recessed into the walls at Iowa State College, Ames, Ia. Capacity: 2000 gallons.

ASK THIS MAN . . .

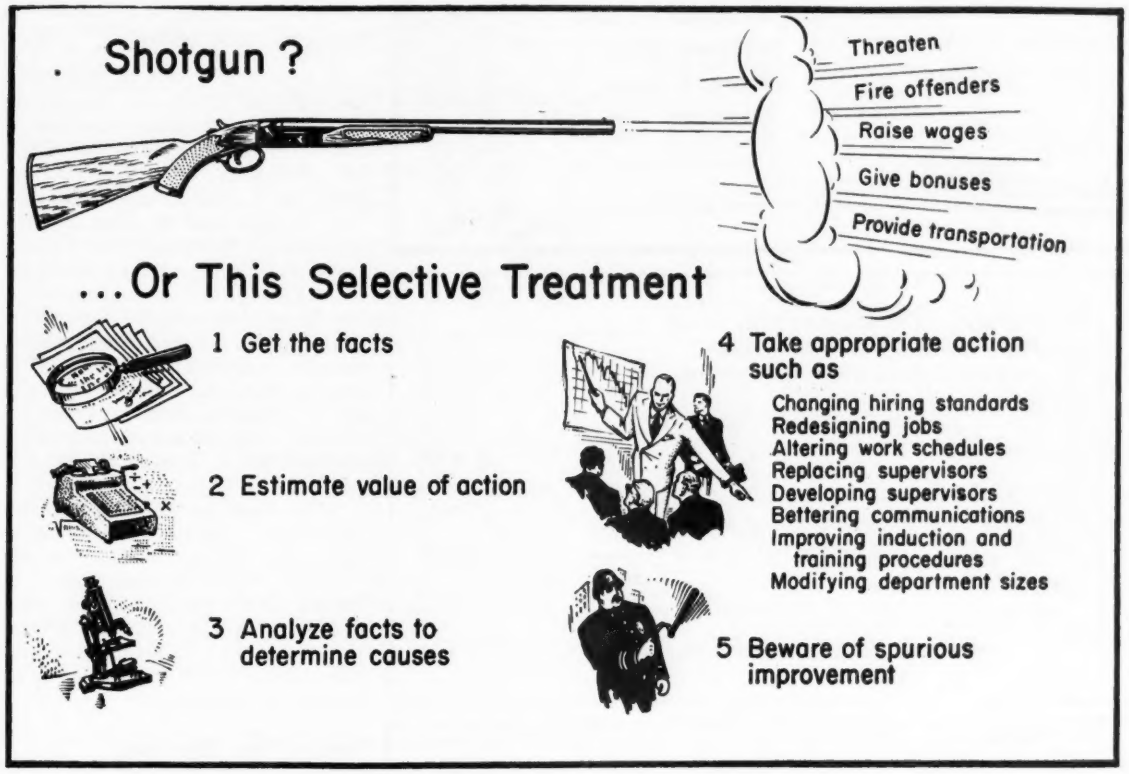
your Cherry-Burrell Representative . . . about our storage tanks. He's prepared to furnish you all the dope you need . . . on the spot . . . to solve your fluid storage problems. See him soon before you wish you had.

CHERRY-BURRELL CORPORATION

427 W. Randolph Street, Chicago 6, Ill.

Equipment and Supplies for Industrial and Food Processing

FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 56 CITIES



This Practical Program

CURBS ABSENTEEISM

You can readily switch most of your "stay-aways" into "Johnny-on-the-spot" employees—if you get down to fine points and then take the proved action detailed here . . . What's more, this plan works potently through supervisors to pay extra benefits that will bolster the health of your plant operations

BERNARD J. COVNER, Ph.D
Assistant Vice-President, Dunlap & Associates, Inc., Stamford, Conn.

Excusable absence of workers has been cut by safety and health programs. But the rise in the inexcusable has become a costly malady justifying intensive study.

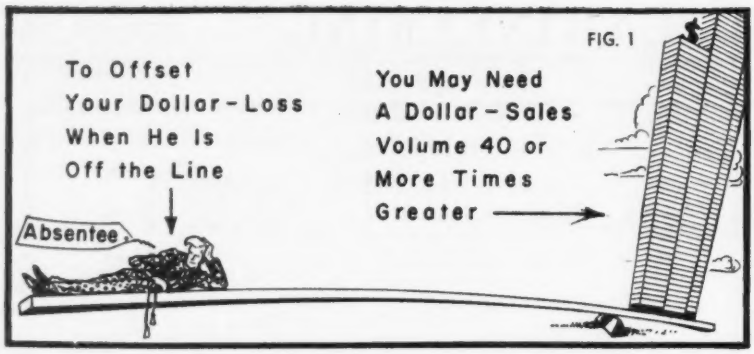
Production losses traceable to absenteeism can be very costly. Often, when perishables are processed, product loss must be added to down-time loss in calculating the price of absenteeism.

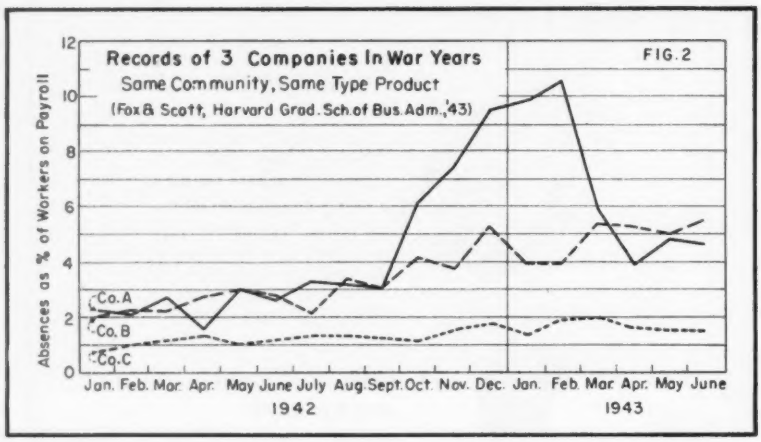
Line employees who are on the job are likely to be severely upset when absenteeism strikes a crucial link. Often the foreman runs helter-skelter to plug gaps, substituting, reschedul-

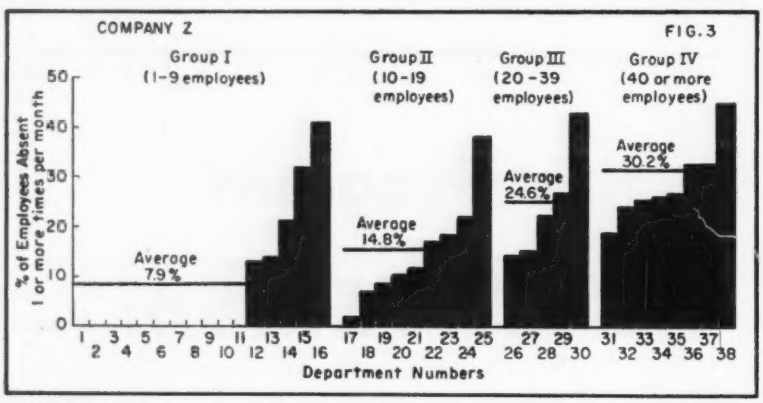
Going Up Instead of Down

Absenteeism is a sadly wasteful extravagance costing business $9 billion per year, according to an estimate by Edward J. Stieglitz (in *Industrial Medicine & Surgery*).

Furthermore, indications are that absenteeism is increasing rapidly. In 1952, all-over absenteeism of men was 130.9 per 1,000 persons, as against 116.8 in 1950. And the rate for females was 344.9 in '52, as compared with 258.4 in '50.




Records of 3 Companies In War Years
Same Community, Same Type Product
(Fox & Scott, Harvard Grad. Sch. of Bus. Adm., '43)
FIG. 2
Absences as % of Workers on Payroll
Co. A
Co. B
Co. C
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June
1942
1943



LARGER the group size, the more workers stay away once or twice a month —as revealed in this study of departments at Company Z. Specific departmental factors that further influenced these records are detailed in text.

ing, and dribbling out rapid and often shoddy emergency training. Well known should be these end results: Forced hiring of temporary fill-in workers, overtime, maintenance of too large a work force just to insure adequate replacements, lowered morale, reduced productivity, and high product spoilage and waste losses.

Of course the rate of absenteeism varies from company to company. Cases are reported as high as 36% (ratio of man-hours lost to man-hours scheduled), or they may go as low as 0.25%. Many industrial relations authorities place the national rate around 6%. A recent study of Los Angeles concerns indicates 3% as average for that area.

Examples of Cost

Here is how one company gages its absenteeism experience: "*Our plant's production output is decreased or reduced by 2½% for every 1% of absenteeism.*"

Another concern figured a salary loss of $15,283 for its 225 employees during a recent fiscal year—money paid them for time they didn't work. Naturally this wasn't the total cost.

Average rate of pay was $1.33 per hour. The 11,433 man-hours lost during the year (5.9 man-days per work day) cost the company $2,553.60 in wages alone for each of six extra workers (fringes not included).

Offsetting It Is Costly

Assume here an average profit after taxes of 5% of sales, as recently reported by the National City Bank of New York as the approximate figure for companies in general. Then $305,660 in extra sales—20 times that $15,283 wage cost—would be required to make up the loss. And overhead costs, if included, would greatly increase this figure.

And remember: That 5% profit figure is high for the food industry. Here, actually, a dollar-sales volume 40 or more times greater than the dollar cost of absenteeism would in many instances be needed in order to produce profits sufficient to offset the loss (see Fig. 1).

Then there are the wage earners. They aren't paid when away. Nevertheless, their absence is likewise expensive, even though the cost is tallied indirectly as lost production, increased down-time, spoilage, wages, overtime, loss of morale, etc. Not infrequently, output on a line is lowered merely by a single worker being out.

Reasons They Stay Away

The fact that absenteeism took on major proportions during "full employment" should provide a tip-off as to its causes. The arguments about "scraping the bottom of the manpower barrel" make little sense when the universality of absenteeism at the time is considered. There simply has not been such a number of people in the barrel-bottom class as to cause so great a lost-time problem.

Of all the investigations, the one by researchers from Harvard's Graduate School of Business Administration dug deepest.

The first major study reported by this team dealt with war-year absenteeism in three different companies in the same community and same industry (see Fig. 2).

Careful analysis of attendance at the two concerns having the worst record (Company A) and best record (Company C) revealed differences in induction methods, payment systems, shift schedules, hours of work, shop discipline, work conditions, and training of supervisors. Here are some of the differences:

Employees of Company A were trained for a specific job only, and whatever on-the-job training they received was sandwiched in with production. Trainees of Company C were first made acquainted with employee

People, Not Machinery

Like the advances with which the food industry is already familiar—in chemistry, mechanics, and electronics—strides in techniques of dealing with human behavior also have considerable cost-saving significance and provide additional avenues for meeting competition.

This article illustrates the increasingly important role of the scientific approach in controlling not the machinery or processes but rather the people who operate and maintain them.—*The Editors*

services and company rules and regulations. They were then taken on a trip through the plant and taught several jobs (to increase the individual's flexibility) by well qualified trainers.

Company A's payment system was based on individual or two-man piece work, while compensation in Company C was determined by group piece work based on 24-hr. shift production.

Foremen Aspects

Company A's foremen rotated with the shift, while the foremen in Company C, though rotated, did not shift with the same group, hence each foreman here eventually worked with all groups.

Plant discipline at Company A followed no specified or authorized procedure, while in Company C absences were discussed with the employee by the supervisor.

Training of supervisors in Company A was superficial—followed no special arrangements. Broad, standardized technical training was administered in Company C so that rotation was feasible. Included was training in human relations skills.

The supervisor was partially freed from line-supervision by the delegation of responsibility to an intermediate-level lineman, who checked on work quality and thus made it possible for the supervisor to keep tab on personnel and personal situations of the employees. Company C's working conditions generally were superior to those of the other companies.

The research findings on these two plants doing the same work in the same community present convincing evidence that the severity of a company's absenteeism is related directly to its management practices.

How to Calculate Absences

The fact that absenteeism at Company C was far lower than at Company A was not apparent from the attendance records. Only after the researchers devised and applied a new and ingenious measure was the true toll revealed.

The method that is still in general use—recording of absences in terms of days or man-hours lost—had been used by these companies. Long absences resulting from extended accidents and illnesses were gaged in the same way as short ones lasting only one or two days. This method obscures the facts.

Using two company departments (X and Y), each with five workers, here is a comparison of the old method (days absent) and the Harvard group's technique (times absent). The period record for Department X shows—

Workers	Days Absent	Times Absent
A	5	1
B	0	0
C	0	0
D	0	0
E	0	0
Average:	1	.2

And this is the record for Department Y—

Workers	Days Absent	Times Absent
A	1	1
B	1	1
C	1	1
D	1	1
E	1	1
Average:	1	1

By "days absent", lost time for both departments was 5 days and the average per worker was 1. Equal conditions of absenteeism are indicated for both departments. But the absence pattern, the real indicator, was not the same.

When the "times absent" method is employed, the average for the period indicates a 5:1 difference between departments. In Department X all time away was traceable to one worker (no doubt with valid reason for absence). In Department Y absence was widespread—symptomatic.

The findings of various researchers utilizing the times-absent measure reemphasizes the importance of management attitudes and actions in controlling this problem.

In one of the times-absent studies, the author was able to establish the relationship between absenteeism and department size, also the influence of quality of the supervision, and the nature of the work. The number of workers in a department has a considerable bearing on attendance.

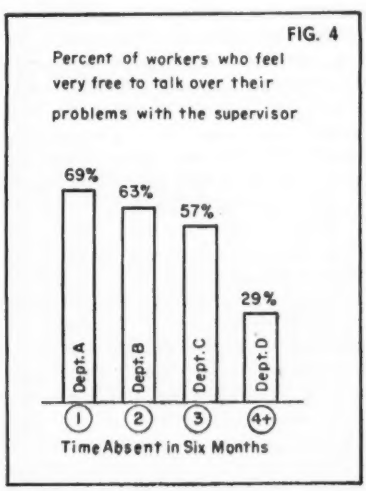
In the chart, Fig. 3, there are arranged, from left to right according to size, the 38 departments of Company Z. In the first 16 departments there were less than 10 employees. In the first 11 no one was away from the job at any time during the months when the study was conducted, and only 7.9% of all employees in all of the 16 departments were away one or more times during the period.

As size of departments increased, the percentage of the total workers with one or more absences increased. That department size is not the only influence on absence is evident from the fact that in Department 31, with 40 or more employees, the stay-away rate was lower than in 8 of the smaller departments, some of which had less than 10 employees (Departments 14, 15, 16).

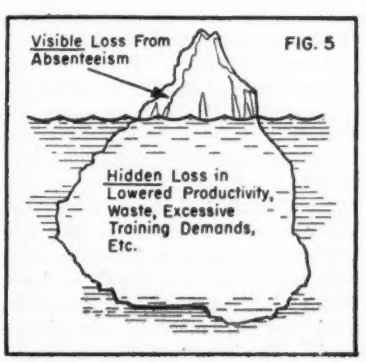
Records Count

Investigation of the possible influencing factors revealed that the company considered its best supervisor to be the one in Department 31. And it also developed that his individual performance records were by far the most comprehensive.

He was one of the few supervisors to keep his own records of attendance, and he also talked regularly with individual workers regarding their absences.



STAY-AWAY-ISM drops as higher percentage of workers in a group feel free to discuss things with the boss.



IN REALITY, the costs suffered from absenteeism take the form of an iceberg—only a small parts shows.

Contrast in supervisory performance was greatest between this Department 31 and Departments 16, 25, 30, and 38, each of which had the highest absenteeism in its group.

"The Boss is a Bum"

A part time "straw boss", recognized for technical ability, but deplored for repeated blunders in human relations, was in charge of Department 16. Due to unsatisfactory job performance in this department, one worker was temporarily transferred to another for remedial instructions. After only one day this operator's production increased 50%.

The supervisor of Department 25, who had a past record of poor relations with other supervisors as well as subordinates, was tolerated by management only because of the difficulty of replacing him with anyone having equal technical knowledge.

Workers in Department 30 were mostly "bobbie soxers", with whom the supervisor (somewhat effeminate in attitude) was ineffectual—miscast. When he was replaced, attendance in the department improved markedly.

The supervisor of Department 38 was, to some extent, an emotional casualty of military service who was placed on the job because no one better was available. Consistently "under fire" for one difficult situation after another, he was finally transferred to non-supervisory work.

Revealed by this study were still other factors influencing attendance, each of them subject to management control. As a group, these factors might be called "nature of work", or job status. Included were the job's reputation for desirability, the degree of skill required, acceptability of wage scale or wage incentive system, and physical aspects of the job, such as strength required, whether the job was mobile or stationary, and whether it was performed standing or sitting.

To shed light on the extent to which nature of the work affected attendance, another study was conducted. Deliberate changes were made in jobs. And the resultant effects, if any, on attendance were observed. Work which had been greatly simplified in an attempt to increase production was made more complicated by combining several jobs into one.

Then, much to the surprise of skeptical observers, absenteeism dropped. And productivity generally improved. Such results were obtained, in both office and factory jobs, with the technique generally known as "job enlargement." The resulting rise in work-interest and job satisfaction accounted for such uptrend in attendance.

Studies recently made relate absenteeism mostly to workers' attitude toward (1) their supervisors, (2) their work group, and (3) the company. In a study of low-skilled workers, amount of absenteeism was found to vary with the freedom to talk over problems with supervisors. Fig. 4 compares departments headed by supervisors who rated various degrees of worker confidence. It indicates that the higher the percentage of the workers who feel free to talk over problems with the boss, the lower the absenteeism.

At one extreme, in a department which had only one absence in six months, 69% of the workers felt this freedom. At the other extreme, in a department where workers had four or more absences over the same six-month period, only 29% felt it.

Other findings in this study, which dealt with both white collar and blue collar workers, point up still other relationships affecting absenteeism. Among white collar workers these were: Satisfaction with supervisor, with wages, and chances for promotion; confidence of recognition for good work well done, personal security as an accepted member of the group, and assurance of the adequacy of the management men above the supervisor.

Among the blue collars were these influences: Foreman's readiness to listen to employees' problems, group solidarity and frequency of group discussions, a liking for the work engendered by the worker's belief that his skills were successfully applied (self expression).

Are Women Different?

Contrary to the belief of some, absenteeism has not been established as essentially a "female problem".

However, certain factors may lead to higher absenteeism among women. One of these is the nature of the work, as indicated by the following:

In one department of a company with an outstandingly good overall attendance, the women's record was quite poor in comparison with the men. Work, pay, working conditions, and supervision were identical for both men and women. But, then careful study to account for the attendance difference drew attention to two facts.

One was that the job required continuous standing and considerable lifting of heavy objects. These jobs had previously been considered "men's work". And bringing women into the department was a threat to the men, who revealed their feelings not only by protest, but also by producing better than ever before (to prove their "natural superiority").

On the other hand, the women tended to believe that they were unwelcome and ostracised, and so they also pushed themselves to prove their equality. And in so doing they harmed their health.

Another factor that can lead to higher absenteeism among women is the "bread-winner status". There is reason to believe that women who, through choice or circumstances, are "work-destined" will be away from the job less often than those for whom work is only a short-range activity.

On the other hand, women more than men are forced to stay home to care for sick children. Yet with few exceptions, women are absent for the same reasons that apply to men.

Staying away from a job can no longer be intelligently viewed simply as a character trait of the individual. It is best considered as a symptom of human behavior. For like a headache, staying away may result from many different causes.

Checking Stay-Away-Ism

Actually, it is very easy to reduce absenteeism. Just lay off or fire a few of the worse offenders. Or get tough in some other way. Of course full attendance does not necessarily assure full production, nor quality of output.

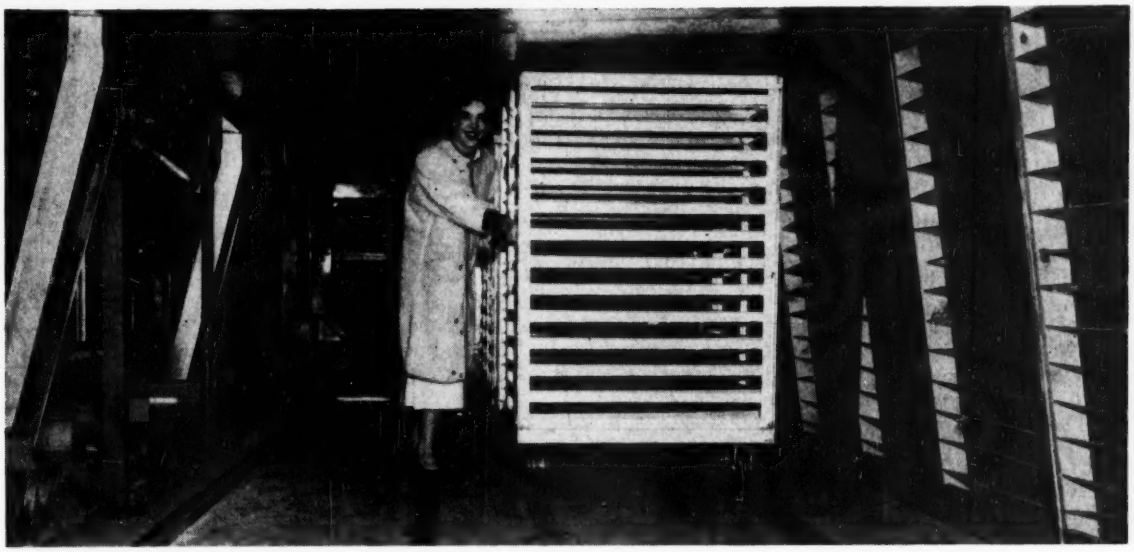
If the company's objective is consistent profits, as it should be, then the control ought to be viewed as a means to an end and not an end in itself. Any action taken should be considered in the light of its probable cost and contribution to the company's overall health.

Control requires removal of causes, even though they may be numerous and varied. Immediately eliminated is the possibility of a single antedote, preventive, or "preservative". However, proper treatment of fundamental causes should result not only in better attendance, but also in various good byproducts leading to improved performance and lowered costs.

No universally applicable prescription can be written. First, it is necessary to obtain the basic facts—find out accurately how prevalent absenteeism is and how badly it is hurting operations. This requires reliable figures and accurate estimates of costs.

It is normal in most companies to record attendance for computing payrolls, filling insurance claims, and other purposes. For absentee-control, transfer this information to separate data sheets and record it in two ways—days absent and times absent. The figures for days absent will be helpful in computing costs. And those for times absent will be useful in appraising the situation as a whole and in studying causes. Also, the latter are more reliable for predicting future attendance than are the days-absent figures.

(*Turn to page 177*)



PACKAGE FREEZER TUNNEL has two tracks to guide tray carts from entrance to exit. Belt freezer and plenum chamber are above ceiling. Here, Pictsweet's Ardis Smilanich demonstrates how easy it is to move light aluminum trucks through tunnel. They are equipped with ball-bearing casters, use low-temperature grease.

Streamlined Conversion

From Canning to Freezing

Belt-type freezing units enable a continuous loose-product flow from receiving to wrapped frozen packages, thus cut labor 44%. Aluminum trays reduce refrigeration needed to freeze hand packed vegetables

Concluding Part II

W. E. HELIN and C. R. HAVIGHORST

Respectively, Chief Engineer, Pictsweet Foods, Inc., and Senior Associate Editor, "Food Engineering"

When in 1953 the 5-line pea and corn canning plant of Pictsweet Foods, Mount Vernon, Wash., was converted to an 8-ton-per-hour freezing plant, many important processing efficiencies were effected.

Three multi-purpose processing and packaging lines for six products—peas, cut corn, cob corn, diced carrots, cut and spear broccoli—enabled 24-hr. continuous operation with a minimum of labor.

Loose products such as peas, cut corn, and diced carrots are now processed, inspected, and flumed to freezing tunnels, then packaged and wrapped on the same packaging lines. And broccoli and cob corn are hand packed and wrapped before freezing on a different packaging line.

These operations were covered in Part I of this article (Nov. FE, p. 94). Here, now, are details of the construction and operation of the freezing tunnels:

Pictsweet pioneered the development of belt freezing for loose products such as peas, lima beans, cut corn, and diced carrots. First such installation was made at Plant F. This was followed by similar ones at Waitsburg and East Stanwood, Wash. Design and operation of these three plants were used for basic data for the new Mount Vernon freezer.

There had been much discussion on the pros and cons of belt freezing operations. Probably the major criticism is that this system was thought to dehydrate the product excessively—as much as 15% had been claimed.

At this time the company was operating three plants equipped with belt-tunnel freezers and four in which foods were packaged, then frozen on racks in tunnels. Here was an ideal situation in which to clarify this question. Peas and cut corn were selected as the test products because they lent themselves to both types of freezing systems.

A series of experiments showed that in no instance was the final product-recovery of belt frozen peas or corn 15% less than the package-frozen product.

These tests indicated, instead, that

a maximum 2% moisture loss more closely approached the true figure. And company engineers felt that if the freezing operation were properly controlled this loss could be reduced to even less than 2%.

With a belt type freezing unit, peas flow through the process from the receiving porch to the wrapped frozen package that is ready for automatic case sealing, without the need for any hand labor except at inspection points.

Cost reports, for a large capacity operation, indicated that direct labor per-pound of belt loose-frozen peas would be 44% less than the best figure of a pre-package tray-and-cart freezing system.

Since nearly 85% of the projected pack at the new Mount Vernon plant would be products adaptable to loose-freezing (peas, cut corn, and diced carrots), use of a belt-type freezer was considered imperative.

However, a pre-packaged (tray and cart) operation had to be included in the design since it is necessary for freezing of cob corn, broccoli cuts, and broccoli spears.

AluminumTrays Economical

For six years the company had been using aluminum trays holding 36 retail packages. Twenty-six trays are loaded into freezer carts, which are equipped with two stationary ball-bearing casters and two swivel casters. Loaded weight of cart is approximately 900 lb., but ball-bearing casters and low-temperature grease reduce friction to the point that one man can easily move them. By spring-scale tests, an average maximum effort of 45 lb. is required to start the cart moving.

Aluminum trays are more expensive than angle-iron steel trays with wire bottoms. However, there are many advantages, engineering-wise, to the use of aluminum. They are cleaner, do not rust, require no expensive wire brushing and painting, and are lighter to handle. Greatest advantage lies in aluminum's excellent heat conductivity and its saving in refrigeration.

A steel tray weighs approximately 40 lb. compared to 3 lb. for aluminum. In a freezing tunnel containing 32 carts, steel trays present a heat load of 350,370 Btu, against only 50,768 Btu for aluminum when cooled from 70 to −20 deg. F. Based on a freezing time of 4 hr., the difference in heat load represents 7 tons of refrigeration.

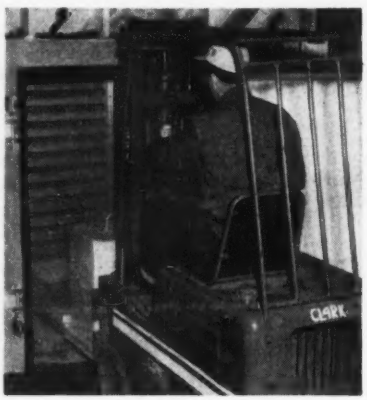
By using aluminum trays, the same refrigeration equipment can freeze an additional 500 lb. of product per hour. Also, aluminum will transit five times as much heat per sq. ft/hr./deg. difference than steel. And had steel trays been used here two men would be required to move the freezer carts, since total weight would be 1,850 lb. —nearly 1 ton—instead of 900 lb.

Tunnel Width Restricted

An analysis made of the three plants then operating belt freezers showed that a reasonable capacity for a single unit was 4 tons/hr. To produce the specified 8 ton/hr. at Mount Vernon required two freezers. Design was restricted in width by column spacing, since existing 12 in. x 12 in. timbers on 17½-ft. centers supported three additional stories.

Since length was not critical, it was decided on a freezer belt 8 ft. wide. Additional surface and capacity was gained by increasing length of tunnel and supplying ample coil surface. In addition, fans were selected that would provide greater static pressure so that the product could be run at least 1½ in. deep on the main belt.

However, two other objectives had to be met in design: (1) Space was required for carts carrying trays of packaged products, and (2) a 24-hr. operation was desired.



LOADED TRUCKS are pushed into tunnel by weighted fork truck.

To provide space for carts, the main freezer belt was elevated to within 2 ft. of the tunnel ceiling. Space under the belt was baffled to provide a plenum chamber in which the fans would built up static pressure to allow a more uniform flow of air through product on the main belt.

Under the plenum chamber two tracks are provided to guide the tray carts through the tunnel. Each track has space for 16 carts in the air stream, which moves transversly to the direction of cart travel. To curb icing of door-gaskets and permit access with minimum infiltration, each end of the tunnel is baffled to provide a "dead spot." A fork-lift truck is used in pushing carts through the tunnel as they are loaded from one end and discharged at the other. Truck employs a weighted pusher designed to keep the wheels from skidding and to exert a uniform stress on the carts.

To prevent damage to the doors at the tunnel exit, which might occur if the truck pushed carts against them, a micro-switch was located at the discharge end. When a cart makes contact with the micro-switch, a red light goes on at the loading end, indicating that the truck is full, and a green light comes on at the discharge end indicating that a cart is ready to be pulled out for casing.

Many Little Problems

Twenty-four hour operation of a belt freezer presented the big problem. This was broken down into many little problems and, by solving the little ones, a satisfactory design resulted.

Problem No. 1 concerned defrosting. In processing operations prior to freezing, the product accumulates moisture on its surface. The refrigerated air-blast picks up this free moisture and deposits it on the cooling coils. In freezing 8 tons of peas per hour, tests indicated that the product contained slightly less than 2% free moisture, or 5.32 lb. water per min. To minimize the moisture carried to the main belt evaporator, pre-coolers were decided upon as a must. Since 5.32 lb. of moisture per min. was to be removed by the pre-cooler evaporators, brine surface units capable of operating at + 10-deg. coil temperature without frosting were required. These units were selected to handle 5.18 lb., since this was the nearest commercial size.

Calcium chloride or ethylene glycol were possible brines and are widely used, but they were not desired due to possible carry-over causing corrosion and product contamination. Since sodium chloride brine was required for operation of quality graders, this was selected.

Measurement of overflow at the units, as a result of free moisture pick-up, was slightly less than 2 qt./min. of 20% by weight (9.45 lb./gal.) brine or 4.16 lb./min. of water vs. 5.32 estimate. Remaining water resulted in a "glaze" on the product, which again in part found its way to the main coil. But part of the glaze protected the product from subsequent dehydration.

Pre-cool units are equipped with proportioning thermostats so air temperatures can be set and maintained precisely. The four units were connected to one compressor and, by means of automatically re-compensated back pressure regulator, modulating motor, and the thermostat, it was

found that the first pre-cool worked well with 30 deg. F. air striking the product. And 20 deg. F. air was used in the second pre-cooler.

First pre-cooler has an air-handling capacity of 12,100 cfm; the second one was selected at 9,250 cfm. These units are capable of keeping the plant in operation on a continuous basis, with no defrosting necessary. Since the product does not stick to the belt, very little cleanup is necessary and 4 to 5 days of operation is possible.

Evaporator Defrosting

Biggest "little problem" concerned selection of the evaporator for the main freezing belt. As mentioned, calcium chloride was crossed off due to corrosion and contamination from carry-over. Regulatory agencies would not clear ethylene-glycol, and propylene-glycol was too viscous. Economically, dry-coils were the best selection, but they required twice daily defrosting, whereas continuous operation was desired.

Finally it was decided to use the dry finned-type coil for evaporators. But where four coils were required in each tunnel, five were installed. The finned coils also provided more surface than would have been attainable with prime surface piping. Four coils were kept in operation and the coils were installed and baffled in such a manner that the fifth coil was available for conventional water defrosting.

The concrete gutter, which extends under all five coils and removes defrost water, can be warmed by a radiant panel. And for added insurance against the gutter's freezing, a heating coil was laid in its bottom.

Each evaporator coil was equipped with two 7½-hp. axial flow fans delivering 13,200 cfm. of air each at 2-in. static pressure. Air off the coils at — 18 deg. F. is forced into the plenum chamber under the belt. Air passes up through the product and returns on the far side of the belt then moves across the cart tracks, and goes back to the coils at — 10 deg. F. Turning vanes were installed in the plenum chamber and a velocity variation from a minimum of 1,100 to a maximum of 1,500 ft./min. was obtained through the free unloaded belt (average velocity with belt loaded and with ten fans operating is 470 fpm.). Removable deflectors are installed when the tunnel is used as a package freezer to give even air flow across the trays in the cart.

Vents Protect Freezer Floor

Another of the "little problems" was housing the belt conveyor, coils, and units. Plant is located on a man-made dyke on the Skagit River. Water is within 3 ft. of the floor level during winter "high water." Since plant operations start in late June and extend almost continuously until December, the possibility of frost heave had to be considered. To be able to read ground temperatures, copper-constantan thermocouples were located at column and wall footings.

In the event that they should indicate freezing conditions in the future, 4-in. drain tile was laid under the concrete sub-floor on 6 ft. centers extending and terminating 2 ft. on each side of the tunnel wall footings. Electric heating cable—or preferably a waste heat circulation medium—can be installed in these tiles when and if needed.

Main freezing tunnel is insulated with 8 in. of rock cork in floor, walls, and ceiling. An aluminum foil vapor seal is employed to prevent water-vapor transmission into the insulation. Pre-cooling units are separately insulated with 4 in. of rock cork in a similar manner.

To prevent concrete spalling under the freezer coils due to the temperature shock when defrost water at 32 deg, hit the — 10 deg. concrete, the company primed and sprayed the concrete with Insulmastic. Previous experience had indicated that this protection was required under coils that were defrosted with water.

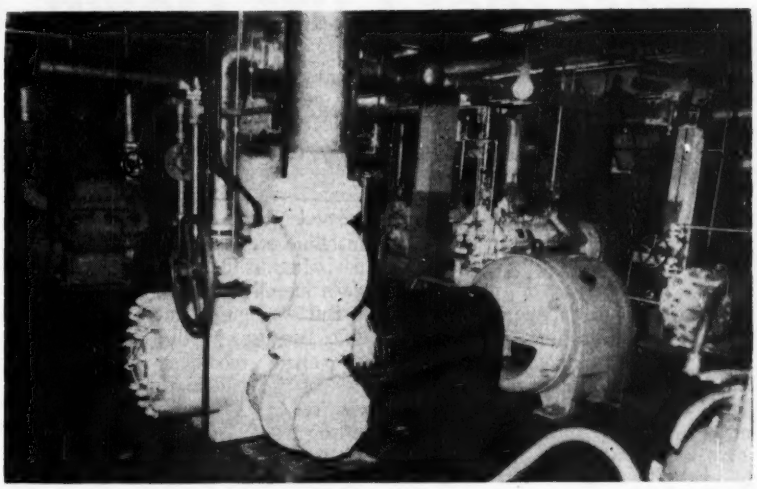
Refrigeration Units and Cycle

Pictsweet uses a re-circulation system at its other plants, and since operation of this system has at all times been satisfactory, it was decided to "stick with it." This system has a low pressure receiver located below the evaporator. Refrigerant is pumped to the top of the evaporator and drains back to the receiver. The low-stage machines—"boosters"—are connected to the low pressure receiver.

At first the possibility of using a centrifugal compressor was considered, but the tonnage of refrigeration was such that conventional high speed

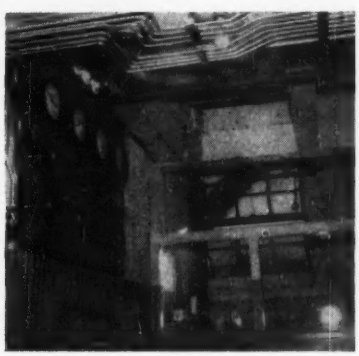
(*Turn to page 185*)

Refrigeration Units, Controls, and Indicators



V-TYPE compressors (rear) and rotary boosters (foreground) provide 192 tons of refrigeration for entire freezing operation.

THIS 16-station recorder charts temperatures at critical locations.



GAGE board keeps engineer informed on operation factors.

And Here's What Down-Time Recorder Chart Shows

Down-Time Automatically Recorded . . .

STOPPAGE record for processing equipment is examined by author (right) and plant superintendent.

Then Chart Is Analyzed . . .

CHECK of charts is made each morning. Previous day's down-time is noted and causes determined.

Recorder Cuts Down-Time 10%

Equipment stoppages in meat plant are indicated on strip charts at central point. Management analyzes charts and corrects down-time causes

JOHN E. THOMPSON
President, Reliable Packing Co., Chicago

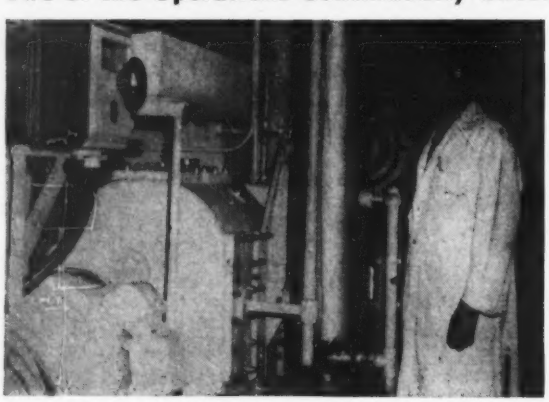
Before you can reduce costly production-line down-time, you have to know what machines are stopping, how often, for how long, and why.

To determine this, plant management must keep an eye on every key machine every minute of the working day. Impossible? Yes, if you try to do it literally.

But we figured out a way at Reliable Packing. With the aid of two strip-chart recorders, which stand against the wall in front of my desk, we "see" every shutdown on 40 lines in the plant. And we gage each shutdown to the minute. It requires little time or effort. Everything is recorded in ink on paper for analysis at a convenient time.

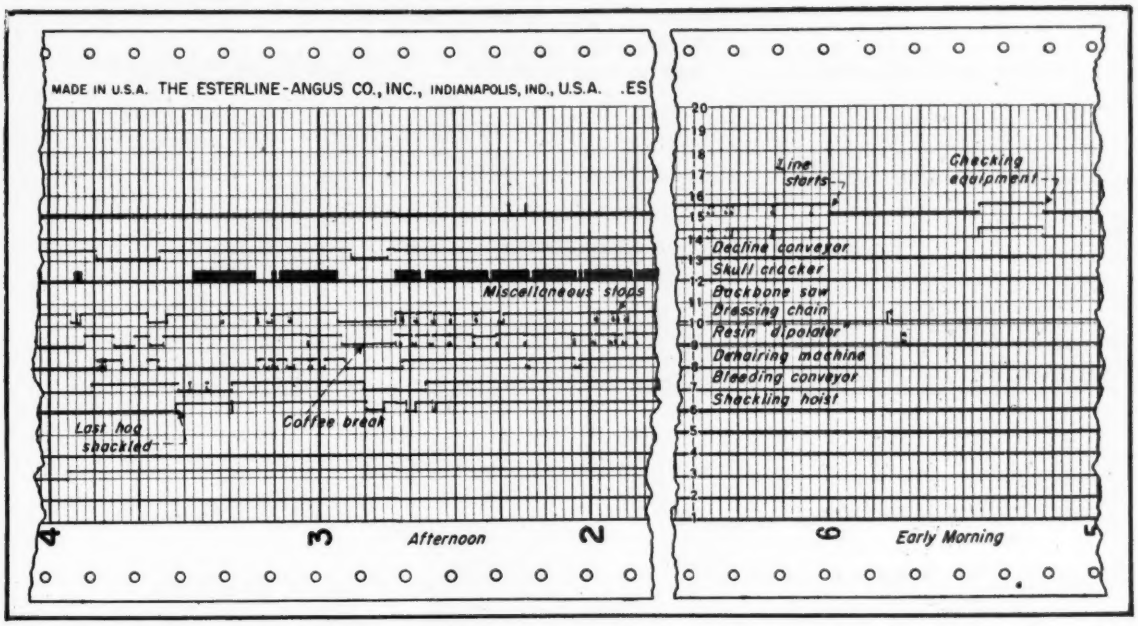
The convenient time at Reliable is first thing in the morning. At that period each day, the plant superintendent and his assistant study the down-time strip charts for the previous

Two of the Operations Continuously Checked by Recorder



TYPICAL PERFORMANCES charted by recorder. Left is expeller in lard rendering department. Right is hog-dressing chain. Even an instant's stoppage is indicated on down-time chart.

And Here's What Down-Time Recorder Chart Shows



TELLTALE EVIDENCE of stoppages is presented by this strip chart. Jiggles and humps in lines indicated stoppages. Lettered on chart are points where maintenance men started equipment to test it, production line start-up, coffee break, miscellaneous stops, and shackling of last hog. Numbers on lines identify operation. In killing department, for example, (6) is shackling hoist, (7) bleeding conveyor, (8) dehairing machine, (9) resin "dipolator," (10) dressing chain, (11) backbone-splitting saw, (12) skull cracker, (13) decline conveyor.

day's operations. And the superintendent reports to the president.

Result of this procedure is an estimated reduction in unnecessary down-time of 10%. In other words, our non-productive labor bill is 10% less in the processing departments.

The reason is that we have been able to isolate delay factors and correct them. On the killing floor, for example, it was found that workers at the viscera table were cramped by too little working space, impairing their productivity. So the table was lengthened. Now the animals keep moving, and throughput is higher. Other bottlenecks were broken by shifting workers in two or three spots.

So the killing-room chain now operates at a fast 360 animals an hour.

Incidentally, we do not aim at 100% efficiency in this operation. We are happy with 90%. To try to go higher would be wasteful of man-hours. Because the animals vary in physical characteristics, some take more time, like the hogs with tough, wrinkled necks. And it's better to have a little delay while a "toughie" is being handled than to have men not working when everything is flowing smoothly.

One of the surprising things brought out by operation of the down-time recorders is that stoppages don't occur in random fashion. Instead, they take a specific pattern—for definite, recurring reasons which can be spotted and corrected.

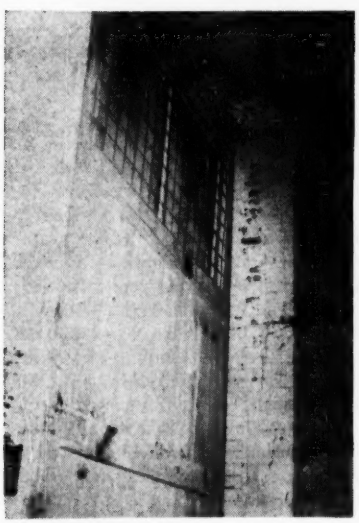
Another discovery that raised management's eyebrows is the fact that a lot of little things may happen to cause production delays when a department head is not at hand to supervise operations. You need pretty constant supervision if you want to minimize down-time.

Effects of mishaps during clean-up and maintenance operations show up on the down-time charts, too. As a result, Reliable has been able to save some valuable production time. On one occasion a motor was accidentally drenched with the wash-down hose, and it took nearly half an hour of production time to get it going.

Now the maintenance superintendent checks all machines early each morning before the production crew

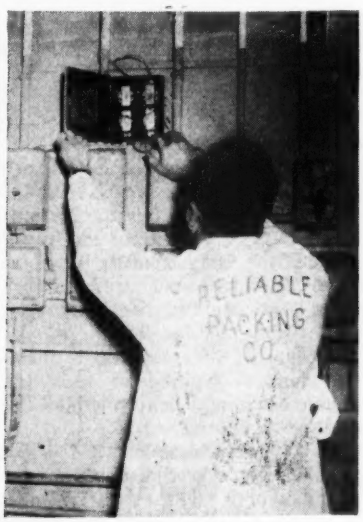
(Turn to page 156)

Outside Door "Watched"

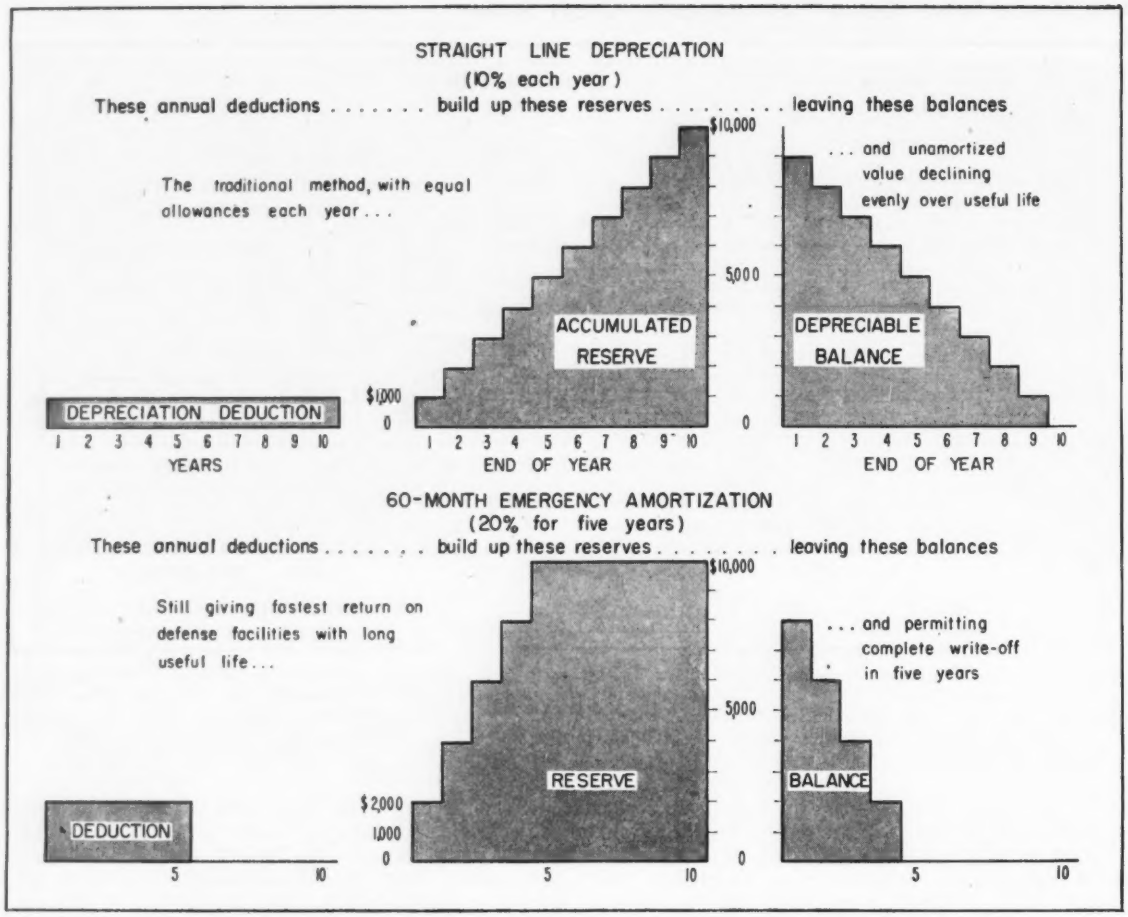


PLANT'S truck door also is connected to recorder to avoid pilferage.

Machine Stops Spotted



DETECTION of stoppages is via small transformers across motor circuits.


STRAIGHT LINE DEPRECIATION
(10% each year)
These annual deductions . . . . . build up these reserves . . . . . leaving these balances
The traditional method, with equal allowances each year . . .
. . . and unamortized value declining evenly over useful life
$10,000
5,000
0
$1,000
0
ACCUMULATED RESERVE
DEPRECIABLE BALANCE
DEPRECIATION DEDUCTION
1 2 3 4 5 6 7 8 9 10
YEARS
1 2 3 4 5 6 7 8 9 10
END OF YEAR
1 2 3 4 5 6 7 8 9 10
END OF YEAR
60-MONTH EMERGENCY AMORTIZATION
(20% for five years)
These annual deductions . . . . . build up these reserves . . . . . leaving these balances
Still giving fastest return on defense facilities with long useful life . . .
. . . and permitting complete write-off in five years
$10,000
5,000
0
$2,000
1,000
0
RESERVE
BALANCE
DEDUCTION
5
10
5
10
5
10

Old Tax Law's Straight-Line and Emergency Depreciation Methods

Right Depreciation Formula

How to select equipment write-off method best suited to your business

WILLIAM H. CHARTENER
McGraw-Hill Department of Economics,
New York City

Your company has more freedom in the handling of depreciation under the new tax law. And your choice of depreciation formulas not only will significantly affect profits, but also the amount of money available for modernization and expansion.

These are the methods of handling depreciation now open to you under the new tax law:

1. Straight-line depreciation over the useful life of assets. Equal amounts are charged off each year.

2. Double declining balance method. Here a fixed percentage, but smaller dollar amount, of the unamortized balance is charged off each year. The increase from 1½ to 2 times the straight-line rate permits write-off of two-thirds of an investment in the first half of its life.

3. Combination of declining balance depreciation during early years and straight-line for later years.

4. Sum of the years' digits methods, not much different from the double declining balance method, but easier to figure.

5. Any other formula that does not give an accumulated write-off greater at any point during the first two-thirds of useful life than would the double declining balance method.

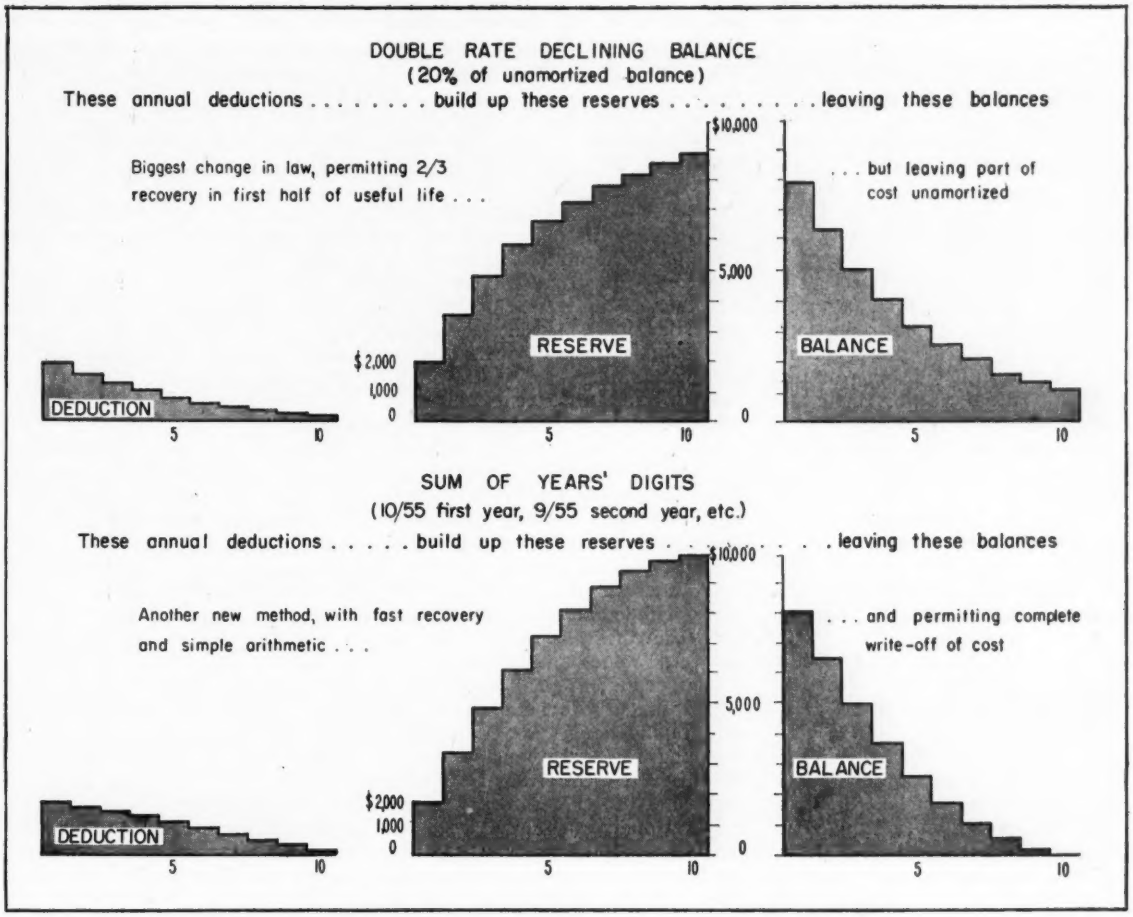
6. Fast amortization, authorized during the Korean emergency on certified defense installations only, recovers cost of plant and equipment in 60 months. It's the fastest way for assets with a long life.

7. Unit of production method, largely limited to extractive industry.

Note, however, that the liberalized declining balance features of the new law may be applied only to new equipment installed, or buildings put in place, after Jan. 1, 1954.

Also, the fast double declining balance methods cannot be applied to any asset with a useful life of less than three years.

The new law, in addition to allowing greater freedom in the choice of depreciation formulas, makes a num-


DOUBLE RATE DECLINING BALANCE
(20% of unamortized balance)
These annual deductions . . . . . build up these reserves . . . . . leaving these balances
Biggest change in law, permitting 2/3 recovery in first half of useful life . . .
. . . but leaving part of cost unamortized
DEDUCTION
RESERVE
BALANCE
$2,000
1,000
0
5,000
$10,000
5
10
SUM OF YEARS' DIGITS
(10/55 first year, 9/55 second year, etc.)
These annual deductions . . . . . build up these reserves . . . . . leaving these balances
Another new method, with fast recovery and simple arithmetic . . .
. . . and permitting complete write-off of cost

New Law's Fast Declining-Balance and Sum-of-Digits Options

Eases Plant Modernization

And how to calculate depreciation rate under method which you select

ber of technical and interpretive revisions that add up to an even better break for the business man.

A depreciation schedule agreed upon in writing, for instance, may not be changed arbitrarily by the Internal Revenue Service. It is specifically stated that the new declining balance provisions do not limit any methods available under the old law. A taxpayer, furthermore, is clearly given the right to use different depreciation methods for different properties.

How Do They Work?

How do the various methods of depreciation work out in practice? Suppose you are buying processing equipment costing $10,000 and having an estimated useful life of ten years. These are the basic ways you can figure depreciation under the new tax law:

Straight-line method. Find the annual rate by dividing 100% by the number of years of useful life (100% ÷ 10 = 10%). Take 10% of the original cost (10% × $10,000 = $1,000). Make this allowance each year until the ten years are up. The allowance is the same each year, the unamortized value of the equipment decreases by the same amount each year, and the equipment is fully depreciated at the end of a ten-year period.

Declining balance method. The new law permits a rate on *the declining balance* up to double the straight-line rate. In this case you would use 20%. Take 20% of the unamortized value each year (first year, 20% × $10,000 = $2,000; second year, 20% × $8,000 = $1,600; third year, 20% × $6,400 = $1,280, etc.).

The annual allowance becomes smaller each year, the unamortized value decreases by progressively smaller amounts, and roughly 10% of the original cost is still unamortized at the end of the ten years. Note that about two-thirds of the original cost is written off in the first half of the useful life of the equipment.

Combination of declining balance and straight-line methods. To avert

the problem of an unamortized residual (10 to 13%) at the end of the useful life which may exceed the salvage value of the equipment, the new law allows you to shift to the straight-line method at any time during the life of the equipment. This permits full write-off (less a realistic salvage value if you wish to deduct it from the value of the equipment). Yet it saves the advantage of faster early write-offs.

In our example, you might want to switch to the straight-line after six years under the declining balance. You would take one-fourth of the unamortized balance remaining at that time and charge off this amount in each of the last four years.

Sum-of-the-years'-digits method. Add the numbers representing the years of useful life (1 + 2 + 3 + . . . + 10 = 55). The sum is the denominator. The number of years of useful life remaining is the numerator. The fraction so obtained is applied to the original cost of the equipment each year (first year, 10/55 × $10,000 = $1,818; second year; 9/55 × $10,000 = $1,636; third year, 8/55 × $10,000 = $1,455; etc.).

The large allowances in the early years are close to those of the declining balance method. But the entire original value can be written off under the one formula during the period of useful life.

Emergency amortization. If a certificate of necessity under the defense program can be obtained, the equipment may be amortized fully over five years, regardless of the length of useful life. In this case, one-fifth of the original cost, or $2,000, could be charged off each year. The entire cost would be written off in five years, and no additional depreciation could be taken subsequently. Note that the certificate need not cover the full amount of an installation, in which case only the certified portion is eligible for fast amortization.

Which Is Best?

What are the advantages and disadvantages of fast depreciation compared with the standard straight-line method? How can you tell which method is best to use in any particular case? Several factors must be considered.

Recovery of investment. Any of the fast depreciation methods enables you to recover the cost of plant or equipment earlier than would the straight-line method. Under a double rate declining balance formula, you recover two-thirds of the original cost in the first half of the useful life (see charts). The sum-of-digits methods gives a slightly smaller figure than the declining balance in the first year or so, but the accumulated reserves soon pass those of the declining balance on a longer period of amortization.

For instance, in our example of $10,000 over ten years, almost three-fourths of the original cost is recovered in the first five years. Fast recovery of investment speeds up availability of money for additional expenditures on plant and equipment.

Accord with actual loss of value. Advocates of accelerated depreciation argue that most machines lose value faster during the early years of their life than during later years, mostly through faster obsolescence and more intensive use.

George Terborgh, in a recent book, *Realistic Depreciation Policy* (published by Machinery & Allied Products Institute) cites evidence of loss of resale value of roughly two-thirds in the first half of average life for a wide variety of equipment. (Buildings, with different characteristics from equipment, he found, did not lose resale value quite as fast.)

The depreciation allowance, it is argued, should reflect the loss of value of a capital item. And the double declining balance formula seems to do this better than the straight-line method.

Effect on taxes. This depends on how your profits, and how tax rates, change over the period of depreciation. If the corporate tax rate remains the same and if each year you make a profit over $25,000 (after charges for depreciation), then the *total* tax bill will be exactly the same no matter how depreciation is figured. You may feel better, however, if you can put off paying taxes as long as possible. Accelerated depreciation, by cutting down taxable income in early years, postpones the years of heavy tax payments.

If you expect tax rates to *fall* in the next few years, then it will be to your advantage (assuming you are right) to hold off your heavy tax liabilities until you have the benefit of the lower rate. The more you can cut down taxable income in high-rate years, the less your total tax bill will be, even though you are paying taxes on the same total income over the entire period.

If tax rates *rise* instead of fall, then an accelerated depreciation formula will stick you with a higher total tax bill than a straight-line formula. You will have used up the bulk of your depreciation deductions in low-rate years.

No matter how you may apportion your depreciation allowances, you can use the total only once.

If you fear you will make money only during the early years of depreciation period, you may gain a tax advantage from an accelerated formula. Your tax liabilities are reduced in profitable years by the higher depreciation allowance, and in years of no profit, a deduction for tax purposes does you no good anyway. So you will not have to make up in higher tax payments later what you gain from taking heavier deductions in the profitable years.

If your bad years happen to be, say, the second and third rather than the eighth and ninth of a ten-year period, then the situation is reversed. The large early-year deductions of the accelerated formula will be wasted.

Another way fast depreciation can save taxes is through the favorable rate on capital gains. Suppose you sell equipment after a few years, long before its "useful life" has expired. You may be able to sell it for more than its unamortized value, especially if you have been writing it off at a double declining balance rate. Your profit over unamortized value in the sale is taxable as a capital gain, at only 25%. But the amount you have saved through fast depreciation allowances was at the income tax rate of 52%.

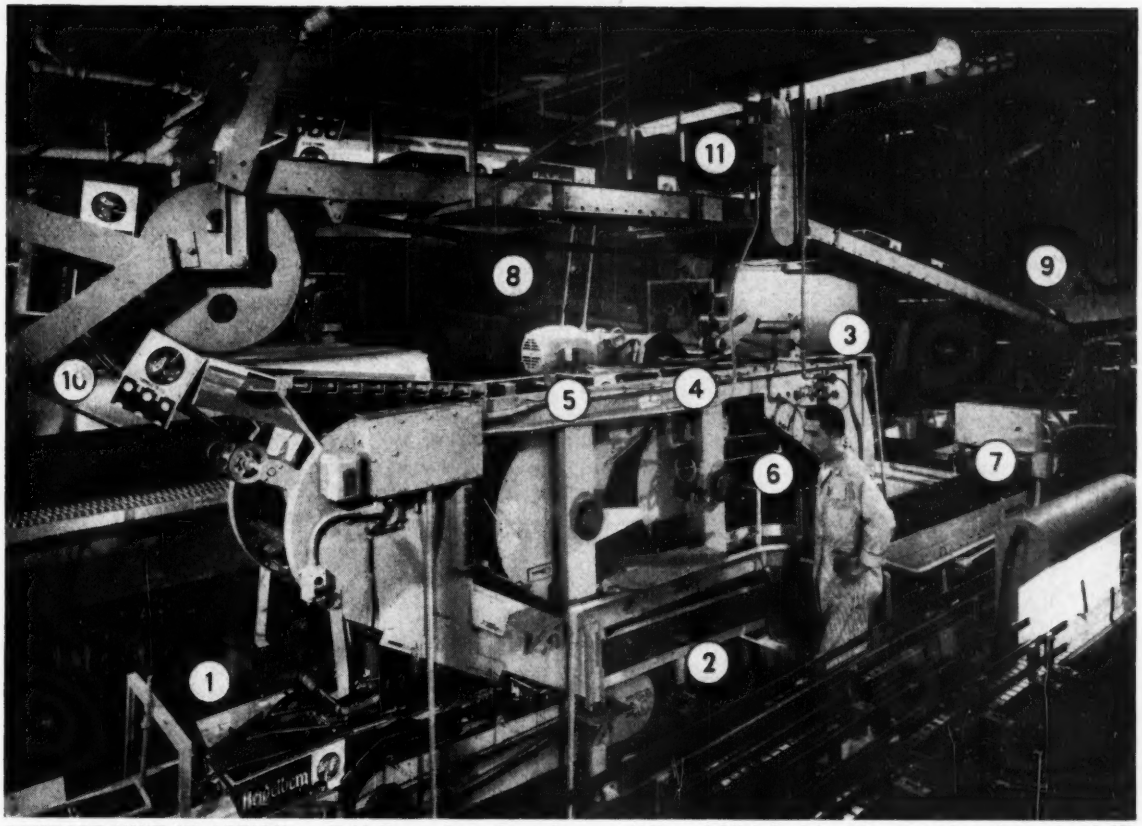
Effect on financial statement. An accelerated depreciation formula tends to reduce the income you report during the early years, with corresponding increases in later years. Depreciation charges on a really large investment can swing a lot of weight in your income statement.

Heavy allowances in the first two or three years may knock a big chunk out of reported profits. The effect in later years, however, would be to improve the profit showing. If you expect poor years later on, fast depreciation will prevent making these charges a continual drag. A straight-line formula, with equal allowances each year, makes the effect of depreciation on earnings the same in the early and later years.

Effect on bookkeeping. A straight-line formula is far easier to use from an accounting standpoint than a declining balance or sum-of-digits method. So, unless a good deal of money is involved, it will probably not pay you to become involved in fancy mathematics. The advantage of the declining balance method also drops when a capital item has a really long useful life.

On a building depreciated over 33 years, for instance, a double rate would mean only 6% in the first year compared with a 3% straight-line rate, and the difference would soon be insignificant. Fast depreciation is of

(*Turn to page 178*)



COMPACT UNIT IN ACTION at Heidelberg. Open-flapped cases (12's and 24's) feed in (1), move along lower level (2) and are inverted (3). Then center rows of bottles are taken by first transfer wheel (4) and outer rows by second wheel (5). Bottles alight straight-up (6) and proceed to loading table (7), whence they feed into soakers (8) and (9). Meanwhile, empty cases are carried from machine (10) onto conveyor (11) enroute to upper floor.

QUADRUPLE BENEFITS

Won by Installing Uncaser

☆ Ups speed . . . ☆ Cuts crew . . . ☆ Saves glass . . . ☆ Eases work

I. E. HEATH
Bottleshop Manager, Heidelberg Brewing Co., Tacoma, Wash.

We are getting 4-in-1 advantages, here at the Heidelberg Brewing Co., Tacoma, Wash., since we put in our new bottle uncaser. For this cost-cutting unit—

▶1. Uncases bottles (two sizes) at a rate of more than 1,000 a minute
▶2. Has enabled reduction in our case-handling crew from 8 to 5 men
▶3. Slashes bottle losses from breakage, and
▶4. Eliminates the fatiguing job of hand-feeding bottles to the soakers.

In truth, however, several rather difficult conditions had to be met before we chose and installed our new machine:

First, there was the matter of space, which is at a decided premium in this downtown brewery. Then a second condition arose from the fact that we receive our empty bottles and cases in pallet loads that consist of a mixture of 12-bottle and 24-bottle cases. Sorting of these cases for separate runs would entail so much additional labor and inconvenience that any other savings made would be offset. Therefore, it was essential that the uncaser be capable of handling both sizes.

This problem further was complicated by the varying percentages of 12-bottle cases found on the pallets. While these cases average only 30% of the total, sometimes individual pallets may carry nothing but 12's. Then for several consecutive minutes only 12's will be uncased.

Since this size provides only half as many bottles as the 24's, a question was posed relative to operating speed of the uncaser. For the rate had to be high enough to keep an adequate supply of bottles moving to the soakers

even when the number of 12's moving through is excessive.

A third condition was that the uncaser should be capable of handling the various "foreign" cases received. Though superficially the same as Heidelberg's, these cases exhibit a number of differences. Some have handle flaps. Several contain 6-bottle cartons of various designs. Weight of board also differs from cases to case. Moreover, a few are two-flap type—and so on. To avoid costly sorting or hand uncasing, we had to have a machine capable of running these odd types.

A fourth condition was that the uncaser be capable of efficiently feeding two soakers having a combined capacity of 575 bottles a minute. A little arithmetic demonstrated that if—even for short periods—half the cases received were 12's, the unit would need to uncase 32 cases a minute to keep even. And allowing 15% for loss of uncasing capacity, due to momentary failure to supply cases and to operational shut-downs, the machine would have to handle 37 cases a minute to stay abreast.

Demands Met

Operating on the principle of continuous rotary uncasing, our uncaser (made by Atkron, Cuyahoga Falls, Ohio, for Radio Corp. of America's Beverage Equipment Div., Camden, N. J.) has the requisite high performance. It can uncase 44 cases a minute —1,056 bottles in 24-bottle cases. And because of its size—only 15 ft. long and about 4 ft. wide—it complied with our space limitations and could be installed without moving existing equipment.

Now let us trace the operational steps: In this plant, cases filled with empty bottles are carried by conveyor from the warehouse to the washer-loading area. Here, shortly before they enter the uncaser, a worker first opens the flaps. And they are kept open by bars above and parallel to the conveyor. (Since the machine cannot process the few cases containing high dividers, this man either substitutes low dividers or diverts such cases to another conveyor, from which the bottles are hand-fed to a washer.)

Cases coming into the machine initially are fed onto a 12-in.-wide table-top chain conveyor in the lower level of uncaser. Feeding is handled by a cam that rotates in synchronization with pusher bars attached to an endless chain operating in conjunction with the conveyor. Should a case go atop one of these bars (rather than be-

(Turn to page 166)

● ● ●

MACHINE'S suction head picks up 196 empty cans at a time from pallet load. It then gently deposits them on conveyor feeding filling units.

High-Speed De-Palletizer

Feeds Empties at 900 Min.

FE STAFF

New efficiency in a key line operation is now being chalked up by The Green Giant Co. following special adoption of a high-speed bright-can palletizer (FE Feb. '52, p. 74).

▶Put to work in the company's Glencoe, Minn., cannery, the unit is depalletizing up to 900 empty cans per minute onto the conveyor system feeding the filling machines.

Here are the details: Cans are received in pallet-load lots, each containing 14 tiers of 196 empties—a total of 2,744 cans. Each lot of empties is specially wrapped at Continental Can Co. plants in corrugated paperboard and steel-band-strapped to the pallet.

Fork-lift truck moves pallet loads from warehouse storage and onto a floor-level roller conveyor that holds four loads. Paper and steel banding are removed as conveyor delivers loads to the de-palletizer.

As shown in photo, empty cans are picked up from each lot, a layer at a time, by suction head of the de-palletizer. They are then deposited in two lines moving to the filling machines.

Unit's suction head is operated by a ¾-hp., trolley-suspended electric hoist, with support furnished by a four-legged I-beam superstructure. Bottom of suction head consists of a multitude of rubber vacuum cups, hooked up by headers to a vacuum manifold actuated by a 1½-hp. pump.

In operation, suction head travels along the trolley over the pallet loads of empties on the floor-level roller conveyor. Then the hoist-lowering button is pressed until suction cups rest on the top layer of cans, whereupon the vacuum-control lever is pressed to lift the load.

Load then is trolleyed to conveyor feeding rotary can unscrambler. Again, hoist-lowering button is pushed until cans are directly over conveyor. Finally suction-cup vacuum (about 15 in.) is broken, releasing cans smoothly and gently onto belt.

25 CONFIRMED

QM preference probes now bear out that these 25 foods—of 50 tested—are decidedly improved by the addition of glutamate

CANNED PRODUCTS

1. Asparagus, spear
2. Corn, white, cream
3. Corn, golden, cream
4. Corn, golden, kernel
5. Green beans
6. Peas
7. Spinach
8. Tomato juice
9. Hominy, fried
10. Boned chicken
11. Pork & gravy
12. Salmon
13. Beef & gravy

FRESH PRODUCTS

14. Green beans
15. Hamburger
16. Cod fish, creamed
17. Haddock, fried
18. Beef stew
19. Baked beans & bacon
20. Chicken soup
21. Margarine (army type)
22. Cream of celery soup

DEHYDRATED FOODS

23. Potatoes, mashed
24. Cabbage
25. Onion soup

These New Facts Will Help You Focus

MSG's Power to Perk Up Foods

Panel studies over 18 months tell you "where" and "how much." But—you can't predict benefits merely on the basis of types of foods and flavors

NORMAN F. GIRARDOT and DAVID R. PERYAM

Respectively, Research Laboratories, Pabst Brewing Co., Milwaukee, and Quartermaster Food & Container Institute, Chicago

That monosodium glutamate has a very definite effect on consumer preference for many foods is clearly substantiated by exhaustive studies at the Quartermaster Food & Container Institute, Chicago.

In these investigations, 50 foods or recipes representing various products and flavor types were tested, showing—

1. Twenty-five were definitely improved (at or below 5% level).

2. Three others showed a trend toward improvement (between 5 and 10% level).

3. Eighteen were not changed, and

4. Four were definitely harmed.

It was anticipated that the effectiveness of MSG would depend upon food class or flavor type. This was not consistently true, although there was a tendency for similar foods to give similar results. Meat dishes, fish, and canned vegetables were frequently improved, whereas cereals, milk products, and sweet flavored recipes were not.

These results suggest that, while flavor type may be a useful guide for planning purposes, the final decision as to the use of MSG in a particular food product or recipe intended for general consumption should be made only on the basis of actual tests of that product.

Method Employed

All preference tests involved MSG concentrations at or above threshold of flavor difference as established by the triangle test. Preference testing was by the method of paired comparisons.

The problem that motivated the studies concerned determination of the value of MSG as a flavoring material for use in recipes of the Army's master menu.

Selection of the foods and recipes was based on several considerations. Emphasis was placed on foods considered pertinent to Army feeding and those where available information indicated that improvement might be found.

Different food types—meats, fish, cereals, vegetables, etc.—were included, and attempts were made to choose representatives of broad flavor types, such as bland, sweet, or sour. However, since almost all prepared foods are quite complex in flavor, it was not possible to make clear-cut distinctions on the latter basis.

In most cases, MSG was added as near as possible to the end point in preparation of recipes so that the stated concentrations would represent concentrations in the foods as served.

Primary consideration was to assure a uniform mixture, and in some cases this was best accomplished by adding MSG prior to cooking. With the fried fish items, uniform mixture was not possible, and the product was sprinkled evenly over the fillets before frying. Nine of the canned vegetables, provided through the cooperation of members of the canning industry, had MSG added before final processing. These items were stored at room temperature 4 to 6 months prior to testing.

Two types of testing were employed:

1. Difference testing by a trained panel whose members were selected on the basis of skill in detecting flavor differences caused by MSG, and

2. Consumer preference testing using a group of about 650 employees of the Chicago Quartermaster Depot.

Although random selection within the latter group was attempted, it could not be achieved because the subjects were not equally available.

The study continued over a period of 18 months and involved a total of about 2,150 individual participations in preference tests. It is estimated that only a very few people took part more than ten times. The program was interspersed with preference tests on other foods, and few subjects were ever aware of the variable being checked. Trained panel members, on the other hand, worked with full knowledge.

To assure that only real and controlled flavor differences would be represented in the preference tests, each food was first studied in a series of tests by the trained panel to determine accurately the amount of flavor differences caused by various concentrations of MSG. Employed here was the triangle technique in which the observer received three samples, two alike and one different, and attempted to pick out the odd sample. The two like samples were always untreated controls.

Initially, the concentration of MSG suggested by available information was investigated. If the trained panel was able to detect a significant flavor difference between the treated sample and the control, this level was tested by consumer preference. If no flavor difference was found, the concentration of MSG was progressively increased until there was a significant difference.

Preference was probed by the paired-comparisons method. In each case a sample of the food containing MSG was presented with a control sample of the same food. Each consumer sampled two pairs at a session, either repeating on the same pair of samples or testing the same food at two different concentrations of MSG.

With failure on one level to show a significant preference, concentration of MSG was increased and the food again checked until a preference for the treated sample was established, or until it became evident that further increases would have either no effect or a negative effect.

This procedure was not followed with the nine canned vegetable items provided by industry. For these, the MSG concentrations were determined by the cooperating company's own research department.

The procedure, illustrated in Table I, shows results on frozen peas. Three concentrations of MSG—0.2, 0.4, and 0.6%—were tested for difference. Since

(*Turn to page 182*)

How Different Foods Respond To Addition of MSG

TABLE I—TESTS Show Effect of MSG on Frozen Peas

MSG Percent by Weight	Triangle Difference			Paired Preference		
	N[1]	Correct Percent	Significant Level	N	Preference for MSG Sample (Percent)	Significance Level
0.20	20	30.0	Insig.	....	.....	.....
0.40	20	35.0	Insig.	....	.....	.....
0.60	20	60.0	1%	40	45.0	Insig.
0.80	....	.....	.....	41	49.0	Insig.

[1] Number of observations.

TABLE II—MOST CANNED VEGETABLES Containing MSG Were Preferred Over Untreated Controls

Product	MSG Percent By Weight	N	Preference for MSG Sample (Percent)	Significance Level (Percent)
Asparagus, whole spear[1]	0.20	80	67.5	1
Corn, white cream style[1]	0.20	80	67.5	1
Green beans[1]	0.30	80	68.3	1
Peas[1]	0.20	80	63.8	1
Spinach	0.20	40	72.0	1
Tomato juice	1.00	82	71.0	1
Corn, golden cream style[1]	0.20	80	62.5	5
Corn, golden whole kernel[1]	0.10	80	61.2	5
Hominy, fried[2]	0.40	40	68.0	5
Lima beans[1]	0.20	80	57.3	Trend
Beans with pork	0.30	80	48.8	Insig.
Sauerkraut	0.30	39	54.0	Insig.
Tomatoes, stewed[1]	0.18	80	50.6	Insig.

[1] Prepared by industry and provided by courtesy of the A. E. Staley Co., Decatur, Ill.
[2] MSG added before cooking.

TABLE III—HOW FRESH, Frozen, and Dehydrated Vegetables Containing MSG Compared With Untreated Controls

Vegetable	MSG Percent By Weight	N	Preference for MSG Sample (Percent)	Significance Level (Percent)
Green beans, fresh	0.20	80	63.8	1
Potatoes, dehydrated, mashed	0.40	79	66.0	1
Cabbage, dehydrated, scalloped[1]	0.20	40	68.0	5
Peas, frozen	0.80	41	49.0	Insig.
Lima beans, frozen	1.00	40	60.0	Insig.
Carrots, dehydrated, creamed	0.10	40	48.0	Insig.
Cauliflower au gratin[1]	0.20	38	55.0	Insig.

[1] MSG added before cooking.

TABLE IV—PREFERENCE Was Shown for Many Meat, Poultry, and Fish Recipes Containing MSG.

Product	MSG Percent By Weight	N	Preference for MSG Sample (Percent)	Significance Level (Percent)
Boned chicken, canned	0.75	40	75.0	1
Hamburger, fresh, fried	0.60	78	65.4	1
Pork and gravy, canned	0.25	80	66.2	1
Cod fish, fresh, creamed	0.40	75	77.0	1
Haddock, fresh, fried[1]	0.40	81	70.0	1
Salmon, canned	0.40	40	70.0	1
Beef and gravy, canned	0.25	80	61.2	5
Beef stew, fresh	0.40	80	61.0	5
Hamburgers, canned	0.50	36	67.0	Trend
White fish, fresh, broiled	0.40	38	66.0	Trend
Chopped ham and eggs, canned	0.75	40	55.0	Insig.
Meat loaf, fresh[1]	0.40	80	52.5	Insig.
Tuna fish, canned	0.60	80	53.8	Insig.

[1] MSG added before cooking.

TABLE V—MANY MISCELLANEOUS Foods and Recipes Were Not Improved by MSG

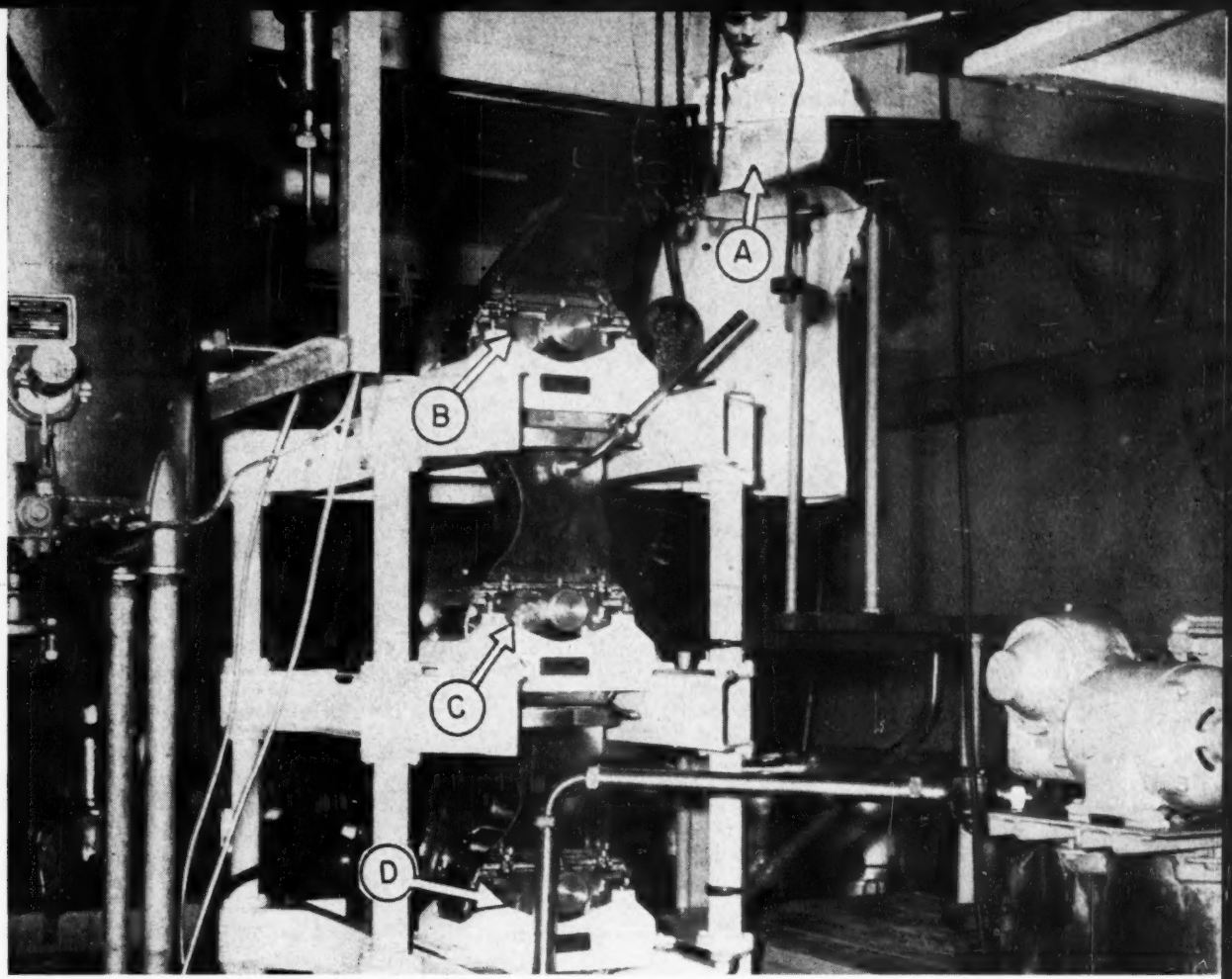
Product	MSG Percent By Weight	N	Preference for MSG Sample (Percent)	Significance Level (Percent)
Baked beans with bacon[1]	0.50	40	72.0	1
Chicken soup	0.06	40	75.0	1
Oleomargarine (army type)	0.20	42	67.0	5
Cream of celery soup	0.40	40	68.0	5
Onion soup (dehydrated onions)	0.70	40	68.0	5
Army bean soup	0.10	40	58.0	Insig.
Eggs, fresh, scrambled[1]	0.40	79	52.0	Insig.
Cottage cheese	0.05	81	43.2	Insig.
Macaroni with cheese[1]	0.20	77	56.0	Insig.
Cooked rice	0.20	39	38.0	Insig.
Bread, army garrison[1]	0.20	81	46.0	Insig.
Chocolate pudding	0.10	40	40.0	Insig.
Vanilla pudding	0.10	41	56.0	Insig.
Corn meal mush	0.05	40	35.0	5[2]
Orange juice, canned	0.10	41	27.0	1[2]
Milk, dry whole, reconstituted	0.07	40	10.0	1[2]
Oatmeal mush	0.10	39	21.0	1[2]

[1] MSG added before cooking.
[2] MSG sample inferior.

TABLE VI—IMPROVEMENT of Foods by MSG as Related to Types of Flavors

Flavor Type	Improved	Not Improved
Sour	Tomato juice	Orange juice Sauerkraut
Bland	Mashed potatoes Creamed codfish Chicken soup Cream of celery soup Oleomargarine Hominy	Vanilla pudding Chocolate pudding Rice Oatmeal mush Cornmeal mush Milk Cottage cheese
Sweet	None	Orange juice Vanilla pudding Chocolate pudding

Simultaneous Grinding and Separation



CODFISH FILLETS are converted to pureed baby food in this triple-stage unit. Whole fillets, fed in at (A), pass downward through comminutors (B,C,D) having successively smaller screen openings, leave bottom as puree.

SIZE REDUCTION

Key to Process Innovations

New, improved products, at lower costs, and with full utilization of byproducts and waste! . . . These are the triumphs that stand to be won when size reduction techniques are applied with imagination to unorthodox uses

GEORGE M. KOVAC
President, Cog Engineering Products Co., Chicago

THE INCREASING DEMAND for methods to offset constantly growing production costs in food processing has pointed up size reduction as the largest single operation open for improvement.

The scope is extremely wide, and already there is a huge list of proved adaptations.

Yet size reduction has lagged far behind other developments in the race toward automation.

In fact, as other processes were advanced, engineers had to resort to side-stepping by "continuous batching" when they reached particle-size diminution using existing equipment and techniques.

A SPECIAL FE ENGINEERING REPORT

Complete Size Reduction of Whole Products

Simultaneous Grinding and Separation

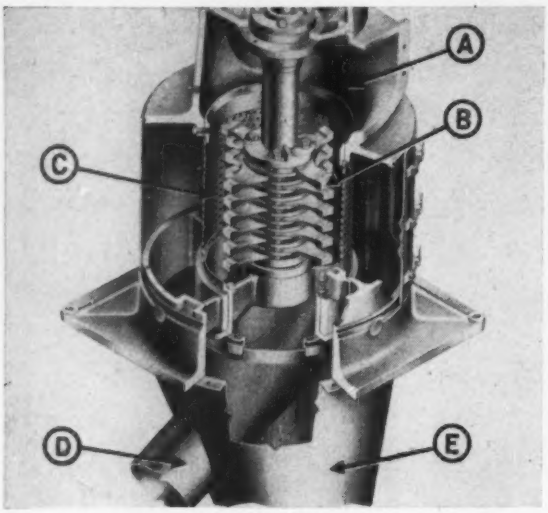


FIG. 1. DIFFERENTIAL disintegrator receives product at (A), pressure or gravity feed, impacts it by hammers (B). Pulp centrifugally discharges through screen (C), leaves at (D). Fibers discharge through (E). (Rietz Mfg. Co.)

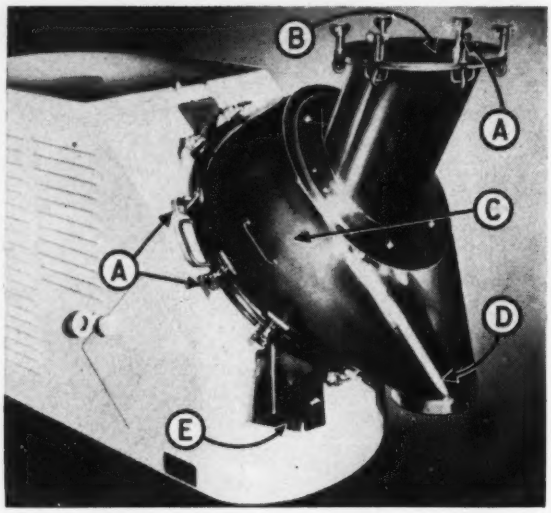


FIG. 2. SANITARY angle disintegrator has toggle clamps (A) for easy disassembly. Product enters at (B), is disintegrated in chamber (C), discharged at (D). Unground material comes out at (E). (Rietz Mfg. Co.)

Inflexible routines and traditions, together with inherent inertia and resistance to change of any established procedure, provided a further intangible complication to the engineer alert enough to visualize the potentials of new and unorthodox approaches.

By patiently pursuing new concepts of size reduction, progressive equipment manufacturers eventually teamed up with food processors willing to try new equipment.

Such cooperation has led to many interesting processing innovations that will grow with additional adapta-

36 SIGNIFICANT ADVANCES THROUGH

1. Continuous production of peanut butter in a single hammer mill. Liquid or powdered stabilizers are fed in with the nuts, all in their proper ratio.
Eliminated: Pre-grinder, mixing kettles, and finishing emulsifiers. Particle size is much smaller than from plate mill. Crunch style is obtained with striated screen.

2. Preparing shredded codfish with single unit—a triple chamber assembly mounted in tandem.
Produces pureed baby food from whole fillets.

3. Grinding lobster or crab shells to a smooth, tasty paste for Newburg sauces and salads.
Brilliant color is achieved, no grittiness can be detected, 100% product use attained with great reduction in labor previously required to remove meat from recesses.

4. Powdering animal glands with dry ice (solid CO_2).
Full potency of extractions is retained due to extremely low temperature.

5. Finishing soup stocks.
Intimate size reduction and wetting of fibers increases absorption of free liquids and improves body of soup. Expensive seasonings can often be cut back as comminution intensifies latent flavors of stock.

6. Reducing whole, unpeeled, raw or cooked carrots to fine puree.
Raw puree from oversize carrots may be spray-dried for use in powdered soup mixes. A tasty spread is made from the cooked pureed carrots by the addition of small amount of apricot flavoring.

7. Grinding oily spices, such as nutmeg and mace, continuously.
High production—600 lb./hr. with 7½-hp. mill—and with shrinkage reduced one-half.

8. Pureeing and finishing vegetable baby foods in single operation.
All particles reduced, thus giving 100% yield. Finisher eliminated. Product upgraded into premium price field.

9. Pureeing cooked meat for baby food on tandem units.
Much finer product obtained and losses due to straining eliminated. Continuous operation from cooker by proportioning meat and broth. Savings: Floor space, labor, power, initial cost.

10. Reducing cracked cacao nibs to chocolate liquor in single chamber.
Eliminates previously used stone or attrition mills. Uses one-fourth the hp., one-eighth the floor space. Cuts maintenance and down-time.

11. Reducing whole citrus fruits to 100% usable concentrate-puree base for soft drinks, fillings, flavors.
Saves labor and waste in trimmings, abolishes disposal problem.

12. "Smoothing" pumpkin to obtain firmer product, greater yield.
All material formerly rejected by finisher is completely reduced.

13. Flash extraction of fat from animal tissue.
Enables continuous rendering of lard or oleo in minutes. Increases yield and gives bland, fine-textured product with exceptionally good color and keeping quality. Floor space reduced 93%, power and labor cut.

14. Finishing catsup to increase viscosity and yield.
All materials reduced, thus eliminating previously rejected pulp at finisher. Color enhanced due to thorough dispersion. Body is improved by the greater absorption of free liquids by fibrous solids.

15. Continuous milling of mealy, cooked peas to produce uniform granulation when dried.
Product retains true flavor and high solubility in soup.

Complete Size Reduction of Whole Products

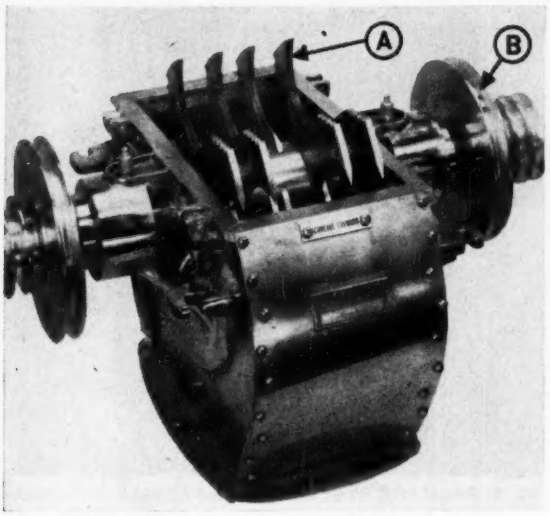


FIG. 3. FLEXIBLE grinding achieved in comminutor by dual-purpose blades (A), sheaves (B). Knife or impact edges obtained by reversing mount. Irregular blade pattern provides labyrinth path. (W. J. Fitzpatrick Co.)

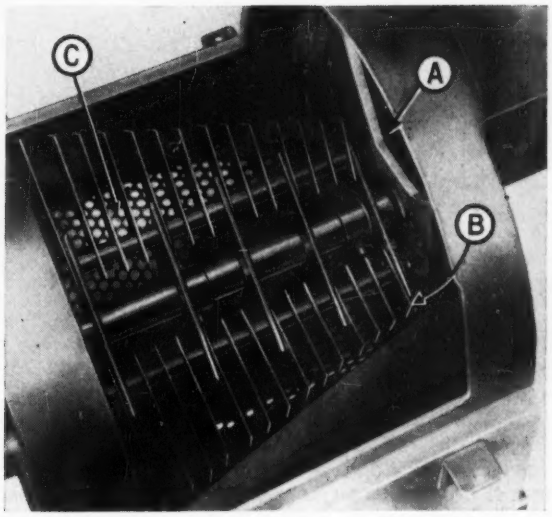


FIG. 4. GRADUAL reduction is obtained by tapered rotor and screen. Product enters at (A), is engaged by short hammers (B). Final reduction is by longer blades with product discharged through (C). (Prater Ind. Products)

tions as alert processors view the benefits in allied operations.

Often, unexpected pleasant surprises result from the discovery that the overthrow of "conventionalism" in size reduction can develop completely new products and markets. Frequently, a highly profitable item results from former waste or byproduct.—100% usability of raw material in reprocessing scrap, shop "cripples," and trim ends.

Principles of the equipment involved in this rebirth are varied, but basically simple. This simplicity is

THE APPLICATION OF NEW TECHNIQUES

16. Grating cheese from whole wheels in continuous process.
Flow time less than 10 min. (including drying) from wheels to packaging.

17. Making cracker meal on continuous basis.
Dough is formed from flour and water metered into comminuting chamber. Baked product is broken to speed cooling, then ground to desired sizes for soup thickeners, breading compounds, and seasoned fillers. Solubility can be predicted and controlled.

18. Combining wet and dry products on continuous basis by "spray-blend" technique. Powders and liquids proportioned in correct ratios into chamber. Size reduction of dry material can be included.
Abolished is tedious batch mixing of hard-to-wet products, such as sova flour. Uniform cooking is obtained without burnt particles of unwetted agglomerates. Instant starch slurries can be formed for salad dressings. Plastic shortening and liquid flavorings may be incorporated into prepared baking mixes. Continuous dough making (see preceding item) is further example.

19. Instant, uniform aging by spray-blending minute amounts of water into product being reduced.
Assures uniformly aged, free-flowing product. Effects notable savings in space, labor, and time (as much as 2 weeks for seasonings and mixes).

20. Frozen eggs reduced to fluid state in 2-stage tandem unit.
Does away with lengthy thawing at room temperature, danger of mold growth. Enables pumping and metering to processing.

21. Bakery "cripples", fallen cakes, rejects comminuted for reincorporation.
Cuts losses, gives low-cost fill for other bakery items.

22. Grinding spices in single hammer-mill on continuous basis.
Substantial savings in space, power, labor, initial investment. Shrinkage halved due to lower temperature in water-jacketed unit.

23. Flash-cooking of whole vegetables and fruits in pressurized chamber during turbulent size-reduction.
Oxidation eliminated, color, taste improved, food value kept.

24. Trim-wastes from processing lines reduced to fine, easily disposed slurries.
Aids in control of stream pollution.

25. Fish gurry or waste continuously converted to cat food in system that includes pre-grinding, cooking, comminuting, dewatering, filling.

26. Liquefying cooked meat trimmings for meat sauce base.

27. Liquefying liver for extraction operations.

28. Utilizing highly nutritious but poorly accepted poultry parts, such as necks, backs, and wingtips, by reducing to tasty paste for roux, croquettes, patties.

29. Liquefying chicken skins for sauces and gravies.

30. Grinding gizzards and hearts with flour and seasoning to make base paste for spreads and salads.

31. Producing sausage emulsion continuously.

32. Grinding candy-pan scraps, nut bars, off-temper chocolate, irregular pieces for re-use.

33. Recovering tea from damaged bags without further reducing piece or particle size.

34. Extracting coffee by grinding bean on hammer mill, with great savings in time and maintenance.

35. Chicken offal ground with solvent, and slurry decanted, polished, extracted continuously by spray-blend technique. Rendered offal in ground form then goes to corrugated pressure rolls that produce dry granulation.

36. Liver sausage, also potted and deviled meats produced continuously by comminution.

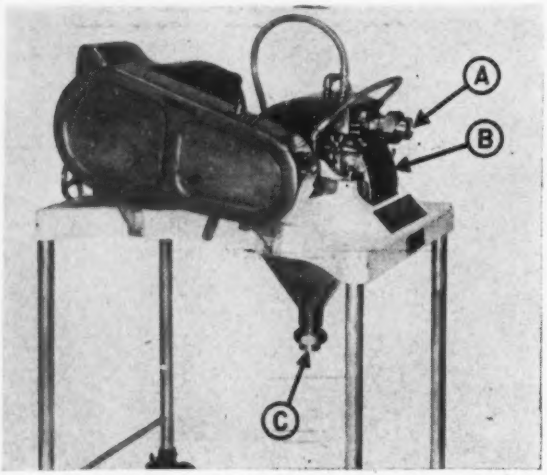


FIG. 5. COMMINUTOR of liquid design made continuous fat rendering possible. Ground, heated product enters unit at (A), is reduced to slurry in chamber (B), discharged to centrifuge at (C). (W. J. Fitzpatrick Co.)

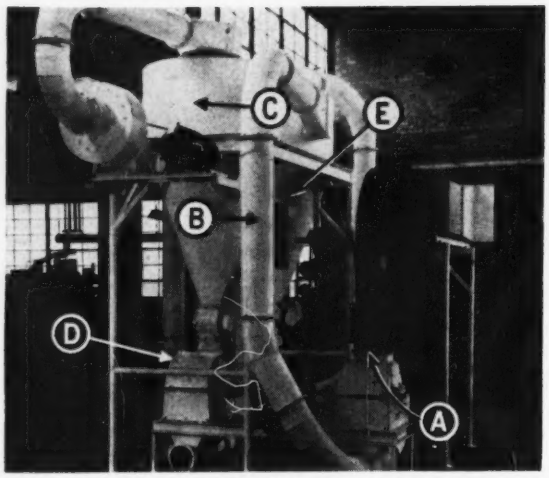


FIG. 6. PACKAGE SYSTEM dries and grinds bread crumbs. Crumbs and hot air enter mill (A), then move through (B) to collector (C). Final grinding in mill (D) is followed by separation in cyclone (E). (Prater Ind. Products)

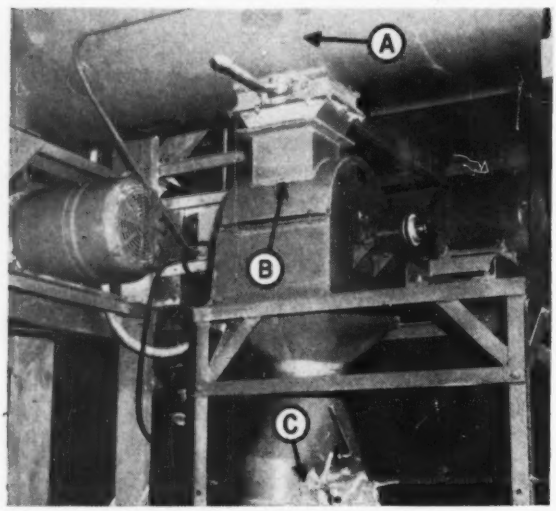


FIG. 7. IMPACT MILL reduces lumps and agglomerates without grinding particles. Ribbon mixer (A) feeds mill (B). Product discharges at (C). (Prater Ind. Prod.)

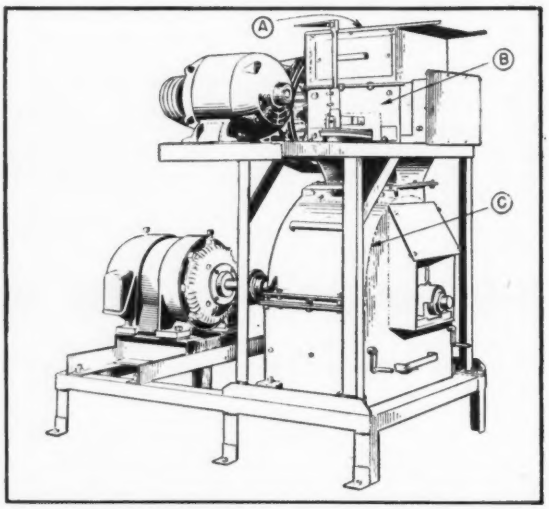


FIG. 8. SIZING-REDUCING unit for horseradish. Roots are fed in at (A), crushed in double-roll unit (B), shredded in mill (C). (Prater Ind. Products)

deceptive, since the full scope of application does not stem from design alone but largely from imagination of the engineer in perceiving new methods and applications.

Equipment and Techniques

Very often, different units can be used effectively on the same innovation, the nod usually being given to the machine easiest to clean or repair. This is a feature too often glossed over by outside machinery manufacturers eager to get into the food industry by quick use of designs borrowed from other fields and dressed in stainless steel.

Current size-reduction equipment and techniques fall into these general functional classes:

1. Selective separation of usable and "non-usable" portions of products.
2. Complete size reduction of whole products.
3. Tandem combination systems.
4. Uniform pre-sizing.
5. Combination size reduction and classification.
6. Air and mechanical classifying units.
7. Typical meat size-reduction units.
8. Single purpose designs.

Choice of the proper unit is usually influenced by physical characteristics of the product to be processed. There must be initial appraisal of material size, frangibility or plasticity, moisture content, critical temperatures such as fusing or caramelizing points, volatile limits such as encountered in essential oils, and flowability. Equally important is consideration of the complete process.

This latter point is graphically highlighted by an instance in the bakers' supply field. Dried fruits had been ground to a paste by processing through slow speed meat grinders at low production rates. Attempts to produce the paste from higher output hammer-type mills failed because of the heat generated by the rapidly revolving blades caramelized the sugar. That the paste was later added to

Uniform Pre-Sizing for Better Control

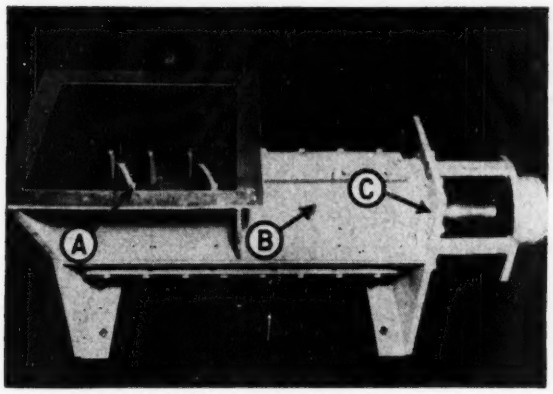


FIG. 9. PRE-BREAKER employs rotating arms (A) that carry raw materials past stationary anvils at (B). Restricting orifice plate, when installed at (C), gives further reduction. (Rietz Mfg. Co.)

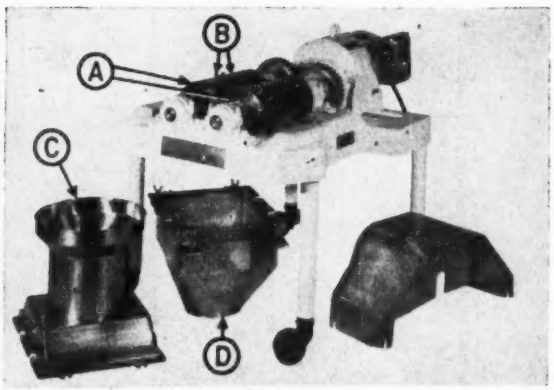


FIG. 10. RIVING MACHINE employs tearing action of two rolls (A) on which are welded hooked studs (B). Product is fed in throat (C), and discharged through outlet (D). (W. J. Fitzpatrick Co.)

water was a completely overlooked step.

Viewing the overall process, water was added to the dried fruit, as fed into the hammer mill, providing additional lubricity to produce puree at 20 times the previous rate for the same horsepower. In addition, quality was enhanced because adding mixing gave more uniform cooking.

Multi-Function Units

There is also illustrated the need for reconsidering conventional terms previously indicating separate operations and different equipment, particularly for liquids or purees. Milling, homogenizing, emulsifying, and wetting all had connoted different operations. Proper application of size-reduction equipment and techniques often permits combining dry product grinding concurrent with liquid addition to the grinding chamber to produce a "spray-blend" operation on a continuous basis.

An outstanding application of this technique is found in making cracker dough. Flour and water are fed at controlled rates through a hammer mill with proper blades, speed, and screen to produce a dough that can be sheeted or extruded. Introduction of CO_2 at controlled rates will produce a simulated gas "rising" of the dough.

Particle shape as well as size must also be considered, and this influences the design of size reduction unit required. For instance, grated cheese should be flaked rather than cubed, in order to provide greater apparent volume and to keep its distinctive appearance when used on sauces. Flaking also prevents compacting in the package. Conversely, products prepared for filling operations would "bridge" in hoppers if they were slabbed or flaked.

The product "grindability" must also be studied. True solids are crystalline with cleavage planes along which rupture readily takes place. These products are efficiently reduced by compression forces of impact-in-air mills.

Other solids do not rupture completely; the parts slide rather than fracture. This plasticity is usually overcome by cutting action. If fruit oil sacs or flavor cells are present, shear or rubbing is needed. But a plate mill is not necessarily required. Proper blade spacing in hammer mills can produce shear forces combined with impact.

Fibrous materials, not usually fracturing in their natural state, have to be torn apart. They are the most difficult to reduce uniformly, wet or dry, because selective grinding takes place, causing gradual fiber build-up in the grinding chamber. In some instances, pretreating through high pressure compression rolls permits efficient grinding, since the fibers are rendered more brittle by the calendering action.

Selective Separation

A unique design for differential disintegration is available through the secondary discharge feature (Fig. 1). If fibrous material requires pulp separation, a simultaneous job of reduction and separation can be accomplished. When blanched asparagus is passed through this mill, for example, a puree is produced from the softer portions and the fibrous portions are rejected through the secondary discharge. This provides a finishing operation and eliminates need for a second step. Also, centrifugal force produces a drier fiber discharge with less pulp.

Additional selective grinding is possible by regulating the secondary discharge opening to control retention time, even to complete closure so that all material is ground fine enough to be impacted through the screen.

The angle disintegrator (Fig. 2) is of a new sanitary design, developed to meet specialized cleaning problems of the food industry. All parts are readily removed with quick-opening clamps.

Here, the principle is broadly that of the hammer mill. Wide face tips of fixed hammers rotate in close proximity to the screen surface, which completely surrounds the rotor. Sizing is controlled by openings in these screens. Screen enclosure (360 deg.) is unique to this mill. Also, material is introduced axially and whirled outward centrifugally. This achieves a combination of plate grinding with hammer-mill action.

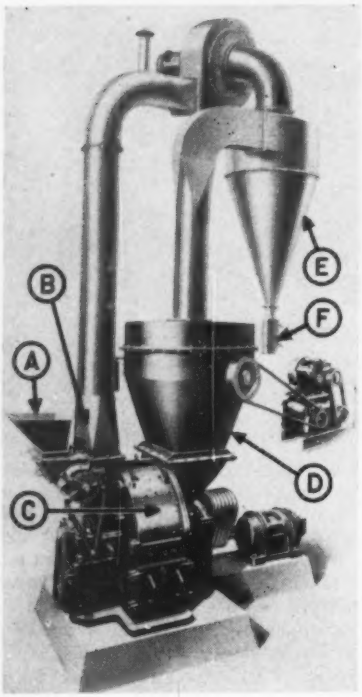
Complete Size Reduction

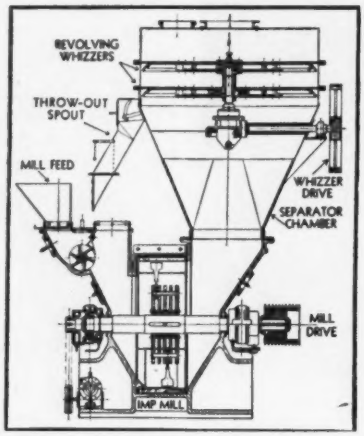
Hammer mill action of comminutor (Fig. 3) impacts material in a tangential path to the whirling blades. However, shear action is also achieved by the labyrinth path that particles take due to blade spacing. Shearing, mixing, emulsifying, and homogenizing actions occur in addition to size reduction.

Various entrance angles of throats, knife or wide-face blades, rotor speeds, screen sizes, and blade spacing give flexibility in particle size. The shearing action ruptures oil sacs and permits processing cacao nibs, peanuts, and almonds. These products will not process on hammer mills without labyrinth shear action. They previously were processed on stone or plate mills.

In fact, use of buhrstone mills is rapidly declining both here and abroad. Greater efficiency, less horse-

Combination Size Reduction and Classification





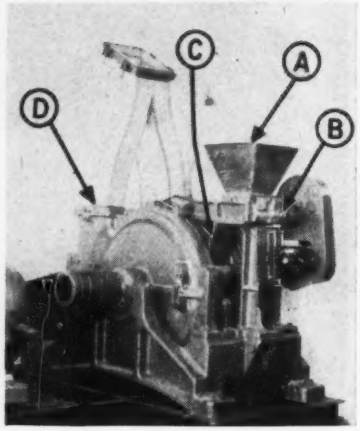


FIG. 11. CLOSED system grinder gives varying degrees of fineness. Product enters at (A), is picked up by air at (B), and fed to chamber (C) where rotating blades grind and discharge it to classifier (D). Proper size material goes to cyclone (E), is discharged at (F). (Raymond Pulverizer Div.) **FIG. 12. WHIZZER MILL** employs hammer-mill type rotor without screen. Material, air-swept full length of chamber, must pass all hammers. Revolving 'whizzers' hold larger particles in chamber until properly sized. For low-melting-point products refrigerated air is used. (Raymond Pul. Div.) **FIG. 13. COMBINATION** impact pulverizer and internal air classifier for lower micron range grinding. Product, fed at (A), is delivered by screw (B) to grinding chamber (C) where hammers reduce size. Classifier blades on hammer shaft return oversize particles, as properly sized ones pass out openings (D) to cyclone. (Pulverizing Machinery Co.)

Air and Mechanical Classifying

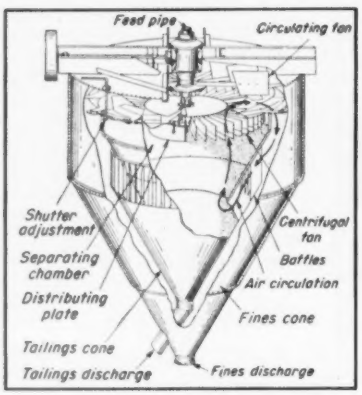


FIG. 14. IN CENTRIFUGAL SEPARATOR, precise control of ultra-fine particle size is achieved by shutter adjustment and speed of fan. In closed grinding system, mill discharges to feed pipe at top and properly sized particles go out bottom. Oversize ones go from tailings outlet to mill for further grinding. (Universal Road Machinery Co.)

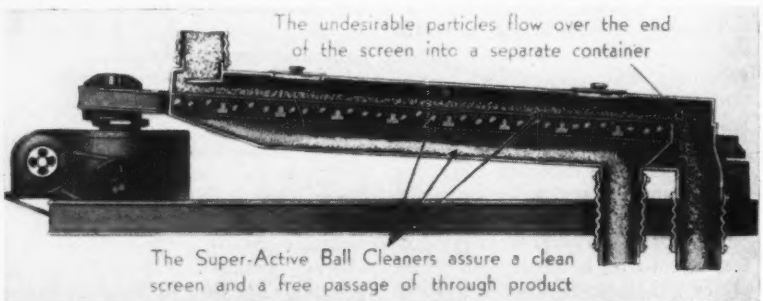

The undesirable particles flow over the end of the screen into a separate container
The Super-Active Ball Cleaners assure a clean screen and a free passage of through product

FIG. 15. MECHANICAL CLASSIFIER gives clean granulation with minimum of fines in closed system. Vibrating screen scalps off oversize particles, returns them to mill. Size of screen variable. (J. H. Day Co.)

power, and savings in floor space and maintenance of impact-in-air mills have shown new approaches to many materials previously reduced on stone mills. Also important is that "stone-dressing" is a highly skilled trade and a shortage of craftsmen is evident.

The tapered rotor and screen (Fig. 4) combines axial hammer-mill feeding and gradual size reduction. The shorter hammers engage the material first. Unreduced material progresses to blades of increasing length and having correspondingly greater impacting forces. As the cone screen increases in radius, effective screen is also augmented, permitting more area for small particles to pass out. This produces a ground product with a minimum of fines.

Tandem Combination Systems

An open throat mill (Fig. 3) is used in combination with a liquid design (Fig. 5) to reduce whole oranges to a puree. This same combination is used for flash extraction of fat.

Two pulverizers are used in the bread-crumb drying and grinding package system (Fig. 6). Fresh, white, sliced bread is converted into edible bread crumbs at 800 lb. per hr.

Bread enters top of first mill with heated air and initial disintegration and drying takes place. Material is conveyed through the closed system by the hot gases so drying is continuous. Flow is split in first cyclone, and product receives final granulation in the second chamber. It is air-conveyed into the final phase, separated from hot gases, cooled to room temperature in another stream of air, and packaged—*all in 26 sec.!*

Impact mills are efficient in "power screening" (Fig. 7). They permit quick power reduction of lumpy materials or agglomerates *without doing any grinding on the individual parti-*

Typical Meat-Reduction Units

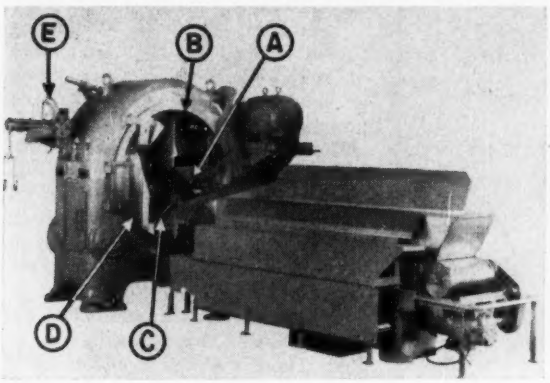


FIG. 16. CUTTER for sausage emulsion, table-ready meats. Ingredients are fed (A) to rotating cylinder (B) where centrifugal force is distributed and holds them as they pass under knives (C). Plows (D) turn and reverse mixture. Unit quickly emptied by turning the handwheel (E). (Globe Co.)

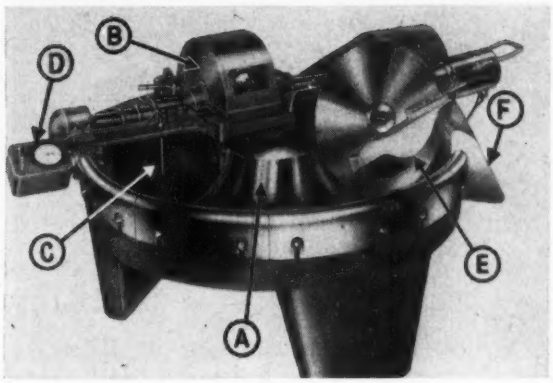


FIG. 17. HORIZONTAL CUTTER employs crescent-shaped knives rotating through slotted comb. Ground meats, other ingredients, added to rotating bowl (A) pass under knives (B) until reduced. Thermometer (C) relays product temperature to indicator (D). Plow (E), lowered into bowl, diverts material to discharge (F). (John E. Smiths Sons)

cles. Also, marbling and spottiness is eliminated, and a uniformly textured, free-flowing product is obtained. Finishing by power screening often reduces mixing time by 75%. Spice seasonings requiring the thorough dispersion of small amounts of oleoresins in large amounts of dry carriers are improved by this technique.

A stainless unit (Fig. 8) combines pre-sizing with final reduction. Clean horseradish roots are dropped whole in the double roll crusher. Mill on the bottom granulates or shreds them to finished consistency for filling into jars.

Uniform Pre-sizing

Size reduction must often include a pre-break operation of raw materials. The pre-breaker (Fig. 9) and double roll crusher (Fig. 10) are available in stainless steel. They usually operate at slow speeds and utilize tearing principles.

In the first, rotating arms convey material past stationary anvils that accomplish the actual breaking. An auxiliary sizing orifice plate gives further reduction and control of size. It is used on horseradish roots in combination with a mill (Fig. 1). It is also used to reduce whole fatbacks and hamskins prior to accurate size reduction in a comminutor (Fig. 5) in continuous rendering of lard.

Riving machine (Fig. 10) quickly reduces whole cheese wheels for final grating. Frozen eggs, cream, tomatoes, and berries are torn into small pieces for incorporation in other products. A slurry for salad dressing and baby foods is made from frozen eggs by using the unit in combination with the comminutor shown in Fig. 3.

Even as consideration must be given to pre-breaking before size reduction, classification after grinding is important. Some designs combine these features in one unit.

A "closed circuit" system (Fig. 11) is made up of individual parts offered as a package. A hammer-mill type rotor is used without a screen. Instead, material is air-swept the full length of the grinding chamber (see Fig. 12) and must pass all of the hammers.

For heat-sensitive products such as cocoa press cake, refrigerated cooling air is used. Cane and beet sugar, powdered starch, soya flour, gluten, and dried yeast are other typical products ground on these units.

The internal air classifier (Fig. 13) returns oversize particles to impact hammers without the product leaving the chamber until it is fine enough to pass through the separating device and be airborne out. A cyclone or other device is needed to separate ground product from the air stream.

Refrigerated air can be used, enabling this mill to be employed for reducing cocoa press cake. In this case, temperature of air is determined by percentage of fat present—50-60 deg. F. for 10-12% fat press cake, 20-30 deg. for 20-26% fat cake.

Air and Mechanical Classifying

Closed-system classifying and cooling can be applied to any reduction unit to take advantage of special characteristics it may have. Sub-sieve grinding of dry products usually needs air classification of ground material. Also, some materials cannot be completely reduced economically in one step. Power needed might be impractical, production rate low, or temperature build-up great enough to caramelize sugars, coagulate proteins and

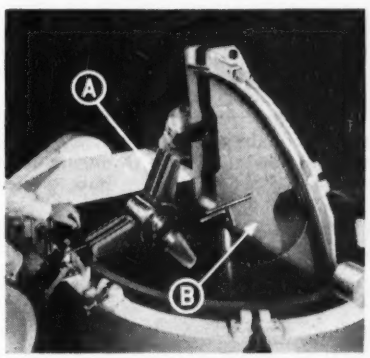


FIG. 18. STRAIGHT-EDGE BLADES (A) without comb provide cooler, faster cutting with unit above. Simplified enclosing cover (B) permits easier cleaning and adjusting of blades. (John E. Smiths Sons Co.)

destroy potency. It is then more economical to grind coarser, classify to separate usable material, and recycle the oversize in a closed system.

Typical example is a mill producing 1,000 lb. per hr. of material 98% through a 200 mesh sieve. For the same horsepower, it could produce over 2,000 lb. per hr., 90% through the 200 mesh sieve. The classifier in a closed system produced 1,800 lb. per hr. of usable particle size, compared to only 980 lb. without it.

If material is fed by gravity and free from excessive moisture, centrifugal air separators (Fig. 14) can be adapted to any mill. In case of a 26-ft. tube-mill producing fine flour, it was found that 60% of the grinding was accomplished in the first 2 ft., 75% in the first 4 ft., 85% in the first 6 ft., and 90% in the first 8 ft. Balance of tube (18 ft.) was used to finish only 10% of the material.

Since power is in direct proportion

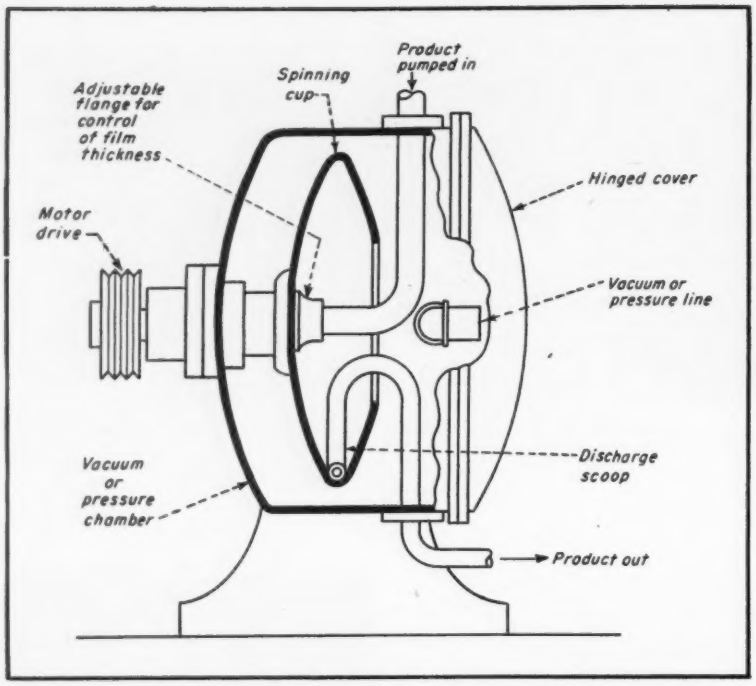


FIG. 19. VERSATILE, continuous, combination operations with any pumpable material are possible with unit of relatively new principle. It smooths lumpy products with its turbulent flow in micro-film thicknesses. Homogenization and emulsification are possible. When used as a deaerator, its centrifugal-scoop discharge action permits emptying in continuously from high vacuums.

to length, over three time as much was needed to reduce the final 10% as for the initial 90%. A separator would have permitted using an 8-ft. mill in a closed system. Instead, feed was increased and output stepped up for the same mill.

A mechanical classifier (Fig. 15) can be used in a closed system in the sieve range of particle sizes. This type vibrating screen is used with impact mills to produce clean granulations of materials which have a limit of fines.

The mill discharges a product having maximum number of fines, letting the oversize percentage fall where it will. Vibrating screen scalps off oversize particles and returns them to original feed. The remainder is good product.

Many spices, including pepper, cracker meal, granulated breakfast foods, and dietary supplements are processed in this fashion.

Meat Reduction Units

In meat operations, size reduction seems to cover the widest range of products, conditions, and requirements. Therefore meat is also in the field in which greatest potentials exist for new approaches. Many operations are now limited to batch procedures due to existing comminutor designs. The answer to continuous size reduction is often the key to a continuous system.

Outstanding in this respect is the comminution operation needed for table-ready meats and particularly in preparing sausage emulsion. Whole meat trimmings, ice, spices, and cure are all fed into cutter (Fig. 16). Knives at the bottom of vertical cylinder rotate in the same direction as the cylinder but much faster. This action produces sausage emulsion after a definite elapsed time.

Another cutter (Fig. 17) consists of a horizontal rotating bowl and crescent-shaped knives rotating through a slotted comb. Meat trimmings must first be passed through conventional meat grinders.

The arrangement of straight blades with no comb (Fig. 18) provides a cooler and faster cut. However, quality of emulsion is still a matter of choice by users.

In this field, a revolutionary new approach has been proved in small scale operations, using features of an impact-in-air unit but with considerable modification. It permits considering a continuous system for making frankfurters.

Probably equally important are such operations as emulsifying, homogenizing, dehydrating and concentrating, dispersion, distilling, irradiating, blending of several liquids, and gassification—all of which can be carried on simultaneously with size reduction.

Centrifugal action of a spinning cup in a unit (Fig. 19) produces a micro-film thickness of material. (It is gradually being introduced in food processing due to its many features and possible uses.) Unit will handle light liquids, or heavy, viscous pastes. The discharge scoop pumps out all material forced into it by centrifugal action. Discharge pressures as high as 30 lb. from a high vacuum are obtained on even heavy compounds.

It also serves as a continuous deaerator for all forms of foods—hot or cold. There is complete smoothing of lumps in cooked material. Vacuum, pressure, or atmospheric conditions can be used in the enclosing chamber.

In addition to smoothing lumps in cooked masses and continuous dearation in canning, above unit has been applied to aid color development by adding controlled amounts of CO_2, also may be used to handle sensitive foods, such as bananas in an inert atmosphere to prevent rapid browning.

Moreover, progress in pilot plant operation on flash cooking is reported very promising.

Other special principles must be mentioned: Jet or fluid energy mills using fluid energy attrition, disassociation using the explosive release of compressed air, impulse rendering employing a hydraulic cavitation principle, and sound impulses using ultrasonic energy in wave form. All these unite specialized considerations in their applications to size reduction in foods, but in very limited fields.

Design for Maximum Potentials

In the venture toward size-reduction that will afford greatest savings, best quality, and most unique innovations in processes and new products on the largest number of products the compass clearly points toward full utilization of the deceptively simple hammer mill principle.

Machine designers can assist by providing flexibility, automatic controls for feeding, jacketing for temperature-controlled processing, pressure chambers for combined reduction and cooking, tandem units for step reduction, and simple "snap-apart" designs for ease in cleaning.

More important will be a man's individual experience with many products and operations in other industries—and the willingness to apply such unorthodox methods as only stem from his imagination and ingenuity. Knowledge of advantages and limitations of various designs will lead to recommendation of equipment best suited to individual problems.

PORTABLE elevating dock can be rolled into position to load or unload trucks or trailers. Or it can be folded compactly to save space when not in use. Permits hand or power trucks to work in over-the-road carriers.—Raymond Corp., Greene, N. Y. (81A)

RESEMBLING an Erector set, all-purpose steel fabricating kit enables fast, easy, and economical building of many types of equipment. Elongated holes, spaced lengthwise in both legs of angle, permit quick bolting.—Acme Steel Co., Chicago. (81B)

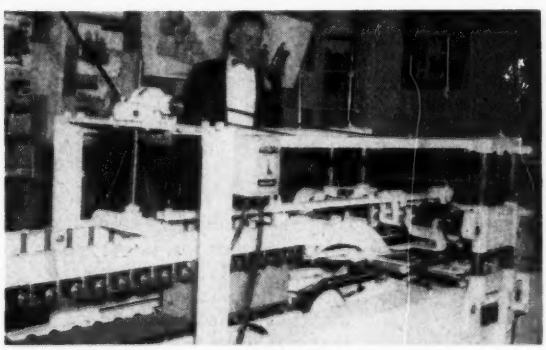
New Packagers, Handlers

—in focus at recent National Industrial Packaging & Materials Handling Exposition held in Chicago

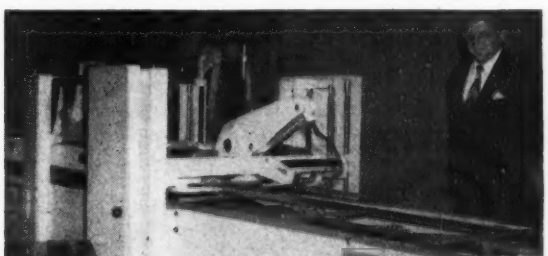
NEW MACHINE makes pressure-sensitive tape, ready for immediate application. Called, the Tapemaker, unit applies adhesive-film coat to different papers, cloth, foil, and films. Maker: Williamson Adhesives, Inc., Skokie, Ill. (81C)

IMPULSE SEALER assures rigid control of sealing, heating, and cooling cycles, together with temperature and pressure control. Will seal Mylar film in variety of gages as well as "poly", saran, vinyl, and other films.—Packaging Industries, Montclair, N. J. (81D)

INTERESTING applications are seen for new high-speed, pre-set electronic counter that hooks to conveyor belt. Here, hopper-fed product goes onto belt and interrupts light beam at end of conveyor. Displayer: Post Machinery Co., Beverly, Mass. (81E)



SHORT, hand-fed case sealer handles 4 to 9 cases per min., depending on size. Cases are fed through automatic gluer by flight-chain conveyor, then continue by themselves through compression unit. Manufacturer: Standard-Knapp Corp., Portland, Conn. (81F)



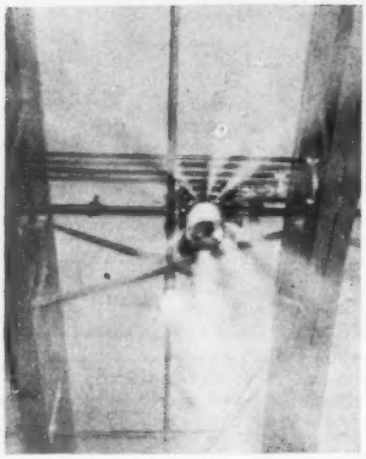
COMBINATION MACHINE automatically glues and tapes top and bottom of 4 to 18 cases per min. in one pass. Features 3-min. adjustment for wide range of case sizes, controlled glue application, and accessibility.—Clybourn Machine Corp., Chicago. (81G)

For More Data, Circle Key Numbers On Readers' Service Card

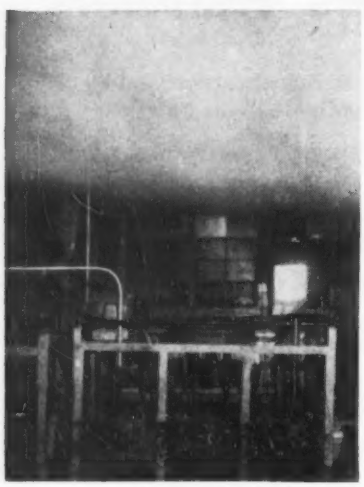
Labor Saving INSECT CONTROL

With Gerber's system of ceiling-rigged atomizers, a single man effectively fogs whole plant in a mere 1/24th of the time taken in former handspraying . . . Each of units will treat 100,000 cu. ft. . . . Equipment, operation, insecticide needs detailed

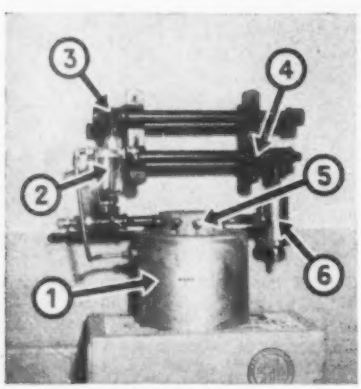
LEONARD TRAUBERMAN
Assistant Editor, "Food Engineering"



LETHAL mist jets from atomizer . . .



. . . and forms dense insect-killing fog that drops down to permeate entire room



DETAILS of unit: (1) reservoir, (2) insecticide strainer, (3) insecticide line, (4) air line, (5) nozzles, (6) air filter.

By substituting efficient mechanics for the old manual insect control, Gerber Products Co., Rochester, N. Y., has revamped a tedious 12 man-hour spraying chore into an automatic 30-min. operation.

Responsible for this significant advance is a space-fogging system that teams up in a well-coordinated sanitation program to feature not only labor saving but also—

- **Ease of operation**
- **Minimum maintenance, and**
- **Efficient use of insecticide**

Keying this system are specially designed atomizers, continuously fed by gravity from a central insecticide supply. Under air pressure, liquid insecticide is diffused into a dry, temporary mist of high killing performance. In this form, it also penetrates crevices where insects breed or hide.

Further, this installation has been successfully tested in dairies, bakeries, breweries, bottling plants, and flour mills.

In contrast to the former manual spraying throughout the plant, operation of the atomizers is controlled by the mere turning of valves. One man tours the plant opening air valves on each section of the system. Later, he closes the valves in a return sequence. All atomizers could be operated simultaneously from a central valve. But this multi-valve setup adds flexibility to the system.

Before taking a closer look at the actual installation, let's see how space-fogging fits into Gerber's overall sanitation program.

Emphasis on Coordination

In addition to insect control, plant sanitation deals with general housekeeping, foreign-material checks, and clean-up. These operations are responsibilities of a sanitarian, along with a cleanup foreman and an assisting crew of 23 men.

By daily inspection, he supervises plant cleanliness and takes action to correct potentially insanitary conditions. As a further control, daily laboratory tests are run on each product taken from the line at several process points. In this way, both the nature and location of any contamination may quickly be spotted.

Clean-up starts at the end of each production day and continues into the next morning.

Daily inspections by sanitarian concentrates on equipment cleanliness. On a standard form, he submits a report of his findings and action taken.

Finally, there is a comprehensive sanitary rating system based on an inspection during plant operation. Made every two months, this check includes the entire plant—all areas, equipment, lighting, ventilation, etc. Ratings provide a continuous record of the progress of all sanitation procedures.

In this plant, high standards of sanitation simplify the insect control program. And close watch on potential breeding areas outside the plant couples with effective screening to reduce the frequency of insect treatment. During the fly season, the space-fogging unit is operated once a week. During non-fly seasons, monthly applications are sufficient.

Just prior to fogging, walls are sprayed by portable gun, with a residual-type insecticide at the rate of approximately 1 gal. per 1,000 sq. ft. Unlike the temporary atomizer mist, its active ingredients are in a solvent that evaporates to leave surfaces coated with a powerful insecticide. Persisting for about a week, this residue helps to curb insects between fogging applications.

For areas too small to be served by

the atomizer system (laboratories, locker rooms), a portable, electrically operated vaporizer is used.

After the space-fogging operation is completed, it is essential that the entire plant be thoroughly cleaned. Thus, before production is resumed, all of the plant's equipment and work areas are rinsed down with clean cold water.

Now for the details of the space-fogging equipment and its operation:

Simple System

The space-fogging unit, installed by plant personnel, has only three basic components: (1) Atomizers; (2) air and insecticide pipe lines; and (3) main storage tank. Since atomizers operate under 80-100 psi., compressed air is required, or steam at the same pressure, may be used.

Atomizers are placed near the ceiling in the center of the area to be treated. A single atomizer will successfully fog an area of up to 100,000 cu. ft., and spacing of units is calculated on this basis. Also suspended from the ceiling are parallel air and insecticide manifolds that supply and support the atomizers. Piping is standard black iron of ½-in. dia. It connects all atomizers with the air compressor and main insecticide storage.

A 50-gal. drum, elevated for gravity feed, serves as the main storage tank. It is, in turn, supplied by pump from another drum of insecticide at floor level. By keeping the insecticide manifold continuously supplied, flow to the atomizers is insured at all times.

Atomizer Details

Cast of zinc-free aluminum, the upper section of the atomizer contains an air chamber that feeds ten primary air-pressure nozzles. All of the latter are fitted with brass insecticidal nozzles machined to close tolerance. These are spaced around the periphery of the atomizer to direct the ejected fog to all parts of the room. If the capacity of the atomizer exceeds that required for a given area, one or more nozzles may be blocked off.

Insecticide, stored in the lower portion of the atomizer, is delivered to the nozzles through syphon tubes. Level of insecticide in the reservoir is kept constant by a copper float that controls the supply from the main storage drum.

A double 100-mesh Monel air filter minimizes clogging of the nozzles by arresting pipe scale and dirt found in air lines. This filter has a self-cleaning feature—condensate and dirt may be blown out through a waste cock without the need for dismantling the unit. When necessary, the air filter screen may be removed for cleaning by simply removing the plug in the top of the strainer and lifting the screen out.

Similarly, a 100-mesh strainer on the insecticide line retards entry of foreign particles that would clog the nozzles.

Although these filters eliminate most maintenance problems, jets do clog in time. Even so, back-pressuring easily frees them of contamination. But, this sends particles back to the reservoir, where they accumulate. About once a year, therefore, it is desirable to dismantle each atomizer for cleaning.

How Unit Operates

From the standpoint of efficiency as well as economy, best method of dispensing an insecticide is to produce a fine, suspended mist. Thus, an area is quickly blanketed with a lethal concentration before insects can escape.

To do this, atomizers are designed to eject a fog of droplets about 8 microns in dia. Particles this small constitute a dry mist of increased killing power. Rather than quickly condensing on walls and equipment, they remain suspended for a relatively long time and penetrate insect hiding places. This permits the use of a minimum quantity of insecticide.

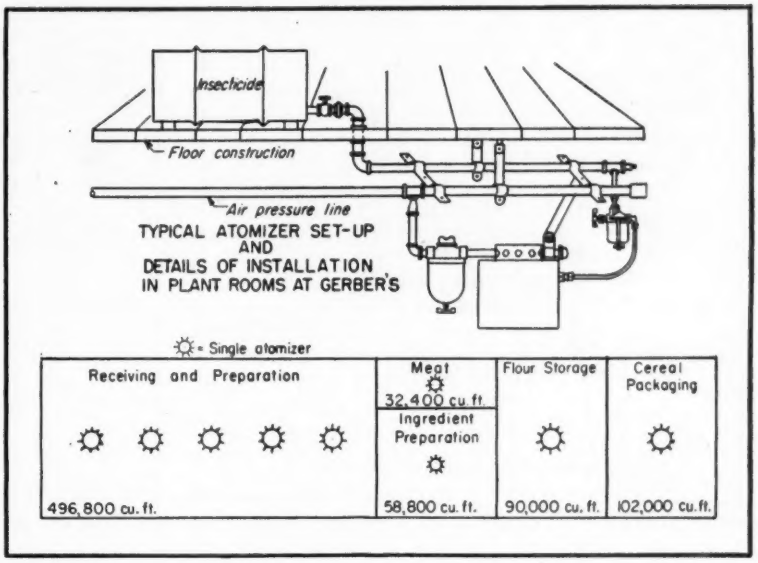
Fogging Formulation

For effective control under all conditions, Gerber's uses 2 oz. insecticide per 1,000 cu. ft. of area in its plant rooms (drawing above).

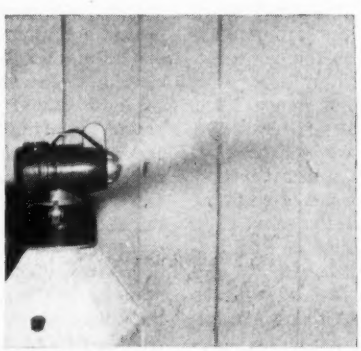
With the Gerber installation, fogging time is calculated on the basis of the atomizer delivering approximately 20 oz. per min. Thus, in 10 min. each atomizer emits 200 oz., an amount sufficient to treat 100,000 cu. ft. for all types of insects.

(Turn to page 220)

Atomizer Mounting and Plant Logistics



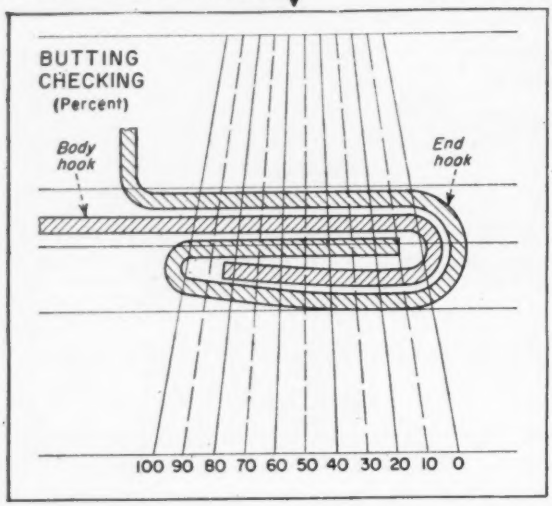
Other Units That Aid

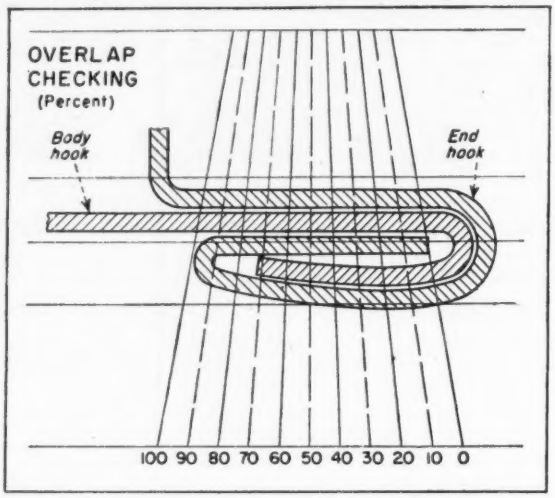


ELECTRICALLY operated vaporizer treats areas not covered by fogging.

AND PORTABLE unit is used to spray walls with residual insecticide.

Seam calibrations ↓ **. . . as revealed by this can-seam projector →**





READ DIRECT (left) is percentage of butting of body hook (85%) and end hook (90%). Right: Overlap is 72%.

7 Strides in Packaging

Specific points of progress get the spotlight in materials-and-procedures sessions held at recent Packaging Institute Forum

FE STAFF

Advances—in a notable variety—were given front-line consideration at the recent 16th annual Packaging Institute Forum in New York City.

The sessions included pointed detailing of newest equipment, materials, and procedures, in some cases with exhibits of the devices and techniques in question.

Here are highlights—

1—Can Seam Measuring Instrument

One new machine, for use by both can companies and operatives in the canning field, enables rapid production-line checking on the double-seams of cans.

Made by Wilkins-Anderson Co., Chicago, the unit saw-cuts a 1/10 in. cross-section sample of a double-seam, and then another machine projects a 40-to-1 enlargement of the sample for studying and checking the calibrations. This image of the sample measures 4 in. on the calibrated screen inside the viewing unit.

Hook lengths can be measured with accuracy since 1/1000 in. on the seam becomes 1 mm. on the measuring screen. Butting and overlap percentages are read directly.

Not only is the shape of the seam, as well as butting and overlap, easily measured and recorded, but in addition several persons may observe the image at the same time through a top-viewing opening. Possibilities of disagreements among line personnel are thus avoided.

The "Waco" seam saw used here has two large blades that make the two cuts across the seam in a single operation.

In order that light for the projection may be directed into the lenses, a positive-setting gage is used to position V-guides. After the cut is made no further preparation of the cross-section sample is necessary.

Presently in use in a variety of canning plants, including a number of breweries, these instruments can be operated with a rapidity to permit viewing as many as 40 samples per hour. Accordingly, these tools are suitable for the operating line—that is, for direct production control as well as for laboratory checking.

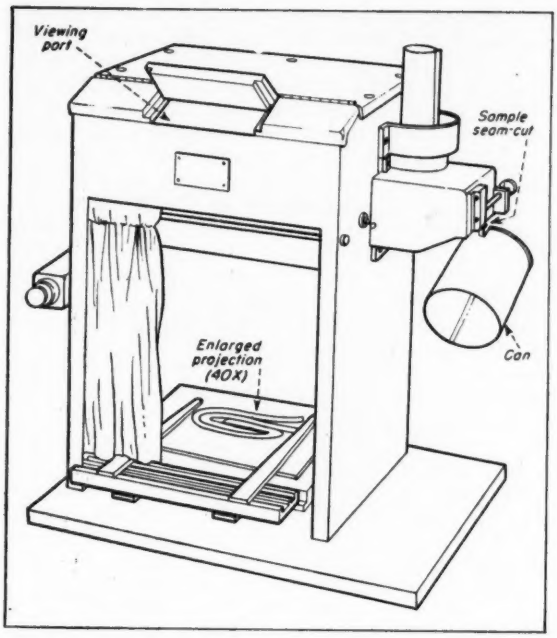
2—"Twist" That Speeds Filling 33%

Eugene L. Hall, Borden Food Products Div., Borden Co., reported how a vacuum filler (Carter Model B-16) was changed to meet requirements when the cover contour of the key-opened containers that were filled on the line were changed, and also how a speed-up in production rate was obtained.

Operation of the filler consists of mechanical placement of can or container upon a platform. There follows immediate raising of this platform, simultaneously centering the container beneath the filling spout and sealing it within a gas-tight shroud. By momentarily pulling a vacuum for partial evacuation of the can, the pressure differential above and below the powder being filled (dry milk solids) causes flow of the product.

When this force is dissipated the container is vented to the atmosphere, thus packing the powder preparatory to a repetition of the cycle. The number of cycle repetitions is dependent upon the model of the filler. In short, the more heads, the greater the number of cycles per turn of the filler.

At the conclusion of the last filling cycle, the platform is lowered and the container is then mechanically replaced on the conveyor line.



CAN with sample cut is merely attached to unit as shown, whereupon a 40X enlargement is cast down on screen inside. Nomographic calibration lines appear with image as noted in illustrations on preceding page. (See Item 1 in text.)

It was this latter operation which proved to be the limiting factor in increasing the machine's speed. The faster the turning speed of the filler, the more jams were encountered at the discharge because of a combination of straight-line lowering of the can from the shroud and rotational movement of the whole mechanism. These two movements produced a wobble which frequently prevented smooth transition of the cans into the discharge star wheel and onto conveyor.

The lift platform was originally designed as a flat plate with circumferential Allen-head screws projecting above its surface and acting as guides to center the can.

Soon abandoned was this arrangement in favor of two U-shaped permanent magnets anchored in a lead platform and oriented so that they pass through the can's diameter tangent to the circumference of the filler's rotational path.

Through surfacing of the platform with a stainless steel non-magnetic plate above the magnets, this scheme was satisfactorily maintained—until the change in container. Despite the manufacturer's guarantee of only 10 cans per minute per head, or a total of 160 per min., with this latter arrangement, the machine had operated at speeds of 190 per min. prior to the new cover contour of the cans.

Then, however, maximum speed was reduced back to 165 per min. This lower rate was caused by doubling the distance between the lift plate surface and the center of the can's cover (from 9/64 in. to 18/64 in.). Because magnetic forces are inversely proportional to the square of the distance between the two masses, this change cut the magnetic holding power to about a quarter of the former strength.

Correction of the situation obviously lay in increasing the forces holding the can against the lifting platform, thus preventing its wobbling. This was accomplished by incorporation in each lifting plate of six additional permanent magnets, disposed so that their axes fell along radii of the cans and at such distance from the centers of the containers that the double-seamed circumference was directly over the magnets.

Chosen were Alnico-5 magnets (Simmons Saw & Steel Co., Lockport, N. Y.). approximately 1 in. long by $\frac{3}{4}$ in. wide and having U-shaped cross sections.

At installation it was necessary to mill the recesses in the lifting plate slightly oversize for the insertion of these magnets. And to insure maximum contact with the covering surface plate, they were bedded on a $\frac{1}{8}$-in. thick piece of rubber.

Success of the changes is evidenced by the filler's faster speed, despite the changes in cover contour.

Other machines in the line are now the limiting factors speed-wise and, therefore, the ultimate speed obtainable since the new battery of magnets was added has never been determined.

Entailing a cash outlay of less than $50, these changes made it possible to increase production speeds 33%.

3—New Boards for Food Packaging

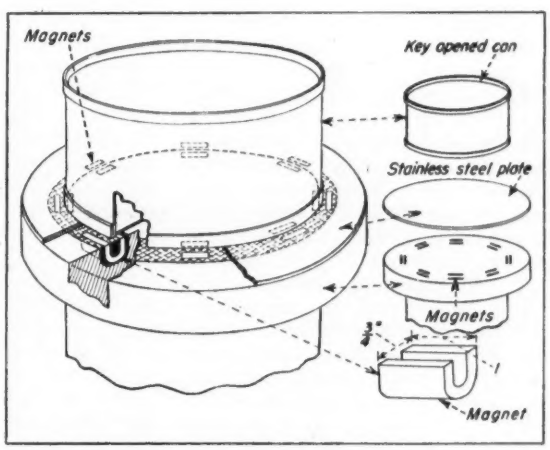
Recently made available are three new packaging boards: Stabilized, polyethylene-coated, and insect-repelling. The stabilized (all conventional grades) are chemically treated to retard development of rancidity when the board is in contact with oxidizable oils or fats that might "wick" in.

Field trials are cited as having proved the effectiveness of these boards for packaging cereals, filled cookies, crackers, and numerous other food items. Elimination of inner bags and special wrappings is a decided possibility in many applications.

Conventional grades of board are also now available coated with metallized or clear polyethylene. The characteristic properties of this film, such as water-vapor resistance, excellent flexibility, chemical inertness, anti-stick, permeability by carbon-dioxide, grease and age resistance, heat stability, and others, suggest application of the board to bakery items, candies, cake mixes, etc.

Available in clay-coated form only are the insect-repellent box board and cartons. Regular seal-in cartons of this type have been subjected to numerous infestation tests with the result that 70 to 100% reduction of infestation was obtainable, as compared with conventional cartons and tight-wrap shells.

Carton sealing adhesives and printing inks can also be treated to offer further protection against insect infestation.



ACTION of can-filler unit is improved by imbedding magnets in a circle relative to the can's circumference. This assures steady discharge at a higher rate. (See Item 2 in text.)

4—Solving Off-Odors and Flavors

Tracing of the sources of off-flavors and odors in foods was discussed by representatives of Foster D. Snell, Inc.

They reported that careful organalystic testing of products wherein scientific methods are used by trained personnel on a tasting panel, plus precise statistical treatment of the results, often succeeds in detecting foreign or off-flavors and odors where the most refined chemical analytical methods are unable to spot their presence.

This fact makes panel taste testing an important tool in trouble-shooting where complaints are vague, foreign flavors are being investigated, or where there is an effort to select proper packaging materials to avoid anticipated troubles.

The task of creating an adequate tasting panel is a big job in itself. It involves screening out those individuals whose sense of taste is not sufficiently acute to be of reliable value. It then requires training of the experts who survive the elimination tests. Such panels, adequately trained, have been able to diagnose causes of off-odors and off-flavors in several interesting cases involving food and other products.

One case concerned Scotch whiskey having an off-flavor. Here it was found that the offending flavor was sherry wine. Scotch whiskey is usually aged in sherry barrels that normally produce no ill effects.

However, when sherry wine was added to Scotch whiskey that was "uncontaminated," the foreign flavor was duplicated. Hence, it was decided that some residual sherry must have remained in the barrels in which the whiskey had been aged.

An off-flavor in frozen foods was traced, by the panel testing technique, to an insecticide used on growing vegetables prior to their freezing in cartons.

So, not all packaging flavor problems are caused by the packages themselves, the preceding instance being a representative exception. There is the case, too, of green (unroasted) coffee that gave off a strong phenolic odor and carrying over to the roasted coffee in amounts sufficient to cause consumers to reject it.

Careful testing, plus some detective work, revealed that the green coffee had been stored in a warehouse which had received a new floor. Prior to laying it, the old floor had been treated with creosote. During periods of high humidity and high temperature when the warehouse was kept closed, the odor of creosote was intensified in the air—and absorbed by the green coffee and the burlap bags in which it was held.

Incidentally a damage claim for a contaminated packaging paper products had been paid by a supplier who had stored the materials in the same warehouse—he had not thoroughly investigated the cause of the complaint.

In another case, a problem was traced to a foreign substance lodged in the interior crevices of the top and bottom seams of steel drums employed for carrying a liquid sugar product used by a brewer. The syrup had a phenolic taste. Ordinary steam cleaning of the drums could not be expected to remove all of the trace material causing the trouble. (It was not stated whether these drums were new or reclaimed used-drums).

The taste panel technique also has been used to evaluate liners for screw caps for mayonnaise. Aim was to select a liner material that, in contact with the product, would be least likely to cause rancidity. Five liner materials were tested. Only two were found acceptable.

Similar investigations have determined the most suitable adhesive for binding cork in cork board, also the optimum material for insulating certain cold storage warehouses. Studies likewise have evaluated wax paper intended for multiple use in packaging foods.

5—Progress With Foil Laminations

T. M. Hill, of the Aluminum Co. of America, discussed the packaging possibilities of aluminum-foil laminations, pointing out that the high yield in amount of aluminum foil per unit of weight in the thinner gages is an importannt packaging consideration. The following table gives the details:

Thickness, (In.)	Sq.In. Per Lb.	Sq.Ft. Per Lb.	Lb. Per Ream, (432000 Sq. In.)
0.00035	29,200	203	12.79
0.0005	20,500	143	21.07
0.0007	14,600	102	29.59
0.001	10,250	71	42.15

In the thicker gages it is impervious to moisture and gases.

The material is also hailed as grease proof, nonsorptive, shrinkproof, odorless and tasteless, non-toxic and substantially sterile, corrosion resistant, non-aging, deadfolding, strong, bright in appearance, opaque, reflective of radiant heat, and readily laminated.

Foil 0.0015 in. or more thick is considered free from pin holes. Water vapor permeability values increase, of course, in the order of increasing holes, and the holes increase in number as the gages decrease. Thus, 0.00035-in. foil has a WVT (water vapor transmission) rate of 0.29g. (average) per sq. in., whereas 0.001-in. foil on the same basis transmits 0.002g. per sq. in. (per 24 hr. with air at 100 deg. F. and 100% RH).

All values of mechanical properties —read by Mullen, Elmendorf, tensile-strength tests, etc.—increase with greater foil thickness. Both Mullen test and tensile strength plotted against thickness show linear values. Hence, the easy Mullen test can be used to indicate tensile strength.

In flat laminations of 0.00035-in. foil, with acetate, the WVT of 0.12g. for the unsupported foil (about 0.001 the value of unsupported acetate) was reduced to 0. Creasing, however, lowers the barrier effect of the laminate, but not as much as with unsupported foil.

Heat-sealing properties conferred by lacquers, averaging 2.2g. per 1,000 sq. in. of surface in double and triple-web laminations of acetate-foil-Pliofilm, acetate-foil-polyethylene, and acetate-foil-Saran have indicated that addition of #80-N2 Pliofilm to #100 acetate and 0.001 annealed foil increased bursting strength by about 20% and tensile strength by 10%.

But 0.0015 in. polyethylene in place of Pliofilm brought no increase in either. Yet 0.001 in. Saran in the same situation raised bursting strength by about 40% and tensile strength by 11%.

Double laminations of foil-plastic have practically perfect resistance to WVT when flat, but show slow transmission when creased. Triple laminates of acetate-foil-pliofilm (or -polyethylene or -Saran, on the other hand) were impervious whether creased or uncreased.

Relatively good heat-sealing bonds were obtained with vinyl-coated foil, but increasingly stronger bonds were made with polyethylene, Saran or Pliofilm laminations.

6—Thermoplastic-Sheet Potentials

The Bakelite Co.'s T. W. Sharp, manager of the firm's Flexible Packaging Materials Div., reported that rigid thermoplastic sheeting materials are finding increasingly wide use in the packaging field.

Modified vinyl and unmodified styrene and polyethylene offer converters valuable properties and characteristics for meeting packaging specifications. An interesting packaging application of formed vinyl sheeting is an individual serving unit for jellies, jams, syrups, and catsups.

Produced continuously, these units have a transparent vinyl film cover, heat-sealed over the top. Other container applications include packaging for oleomargarine, butter, and ice cream. Ready-forming and excellent "in use" characteristics, such as low permeability to moisture and air, have made vinyl materials particularly attractive.

(*Turn to page* 220)

DESIRED glass-like luster is exhibited by hard candies (left) that had good protective packaging. And cut piece (in hand above) shows that quality goes all the way through. In contrast, candies on right have picked up moisture, thus losing sheen, and with "graining" forming a deep layer, as noted in cut piece.

Thwarting Bungles When Batching

F & F of Chicago knows it will get first-quality products—assured by this precise regimen (from which other processors may well "take a leaf"):

¶ Constant defining and resolving of problems . . . ¶ Unceasing checking of materials . . . ¶ Tightening of every control measure . . . ¶ And ever seeking to improve its hard candies

A. B. CRAMER
Chief Chemist, F & F Laboratories, Inc., Chicago

Making top-grade hard candies is not easy.

Yet once the problems have been spotted and analyzed and proper control measures set up, progress along the road to quality is very notably augmented.

We will discuss the factors that influence hard-candy quality and shelf-life, pointing out steps called for to keep operations "aimed for the optimum."

At F & F Laboratories, Chicago, two distinctly different types of hard candies—cough drops and fruit-flavored drops—are manufactured. To make the former, a candy base is prepared so that the drop will dissolve in the mouth slowly and so provide a prolonged trickle of medicated fluid over the irritated area of the throat.

Here, solution rate is reduced by raising the amount of corn syrup in the candy formula. For it is the dextrins and other less soluble polysaccharides in the syrup that slow down solution rate.

Flavor and texture are not as important with cough drops as with fruit-flavored hard candies. Nevertheless, the cough-drop consumer is quite familiar with the characteristic flavor of the product and so is quick to detect off-flavors in even the most highly medicated product.

So once a formula has been approved, it is necessary to adhere to it strictly and to exercise every possible uniformity control. This, of course, involves controlling the quality of raw ingredients.

For the requisite of good shelf-life, candy base and package are prime factors. The candy itself should be bright and sparkling in color, with a high degree of transparency. Sought is a smooth, almost slick candy surface to produce "mouth life".

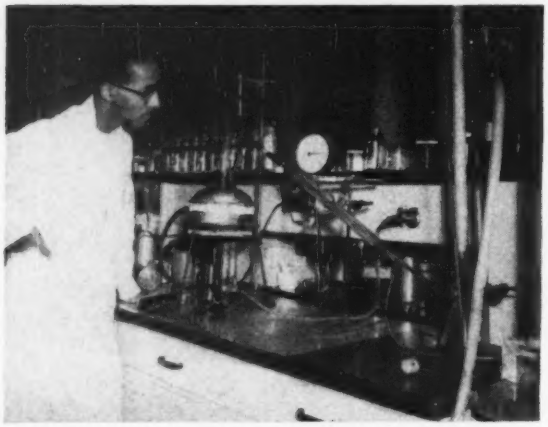
Moisture and Reducing Sugar

Insofar as stability of candy base is concerned, moisture and reducing-sugar content play key roles. Moisture, preferably less than 0.5 and not in excess of 1% is essential not only for long shelf-life but also for smoother production-line operations.

On a par in importance is reducing sugar. Here, if the product has too much, it becomes very hygroscopic and extremely susceptible to climatic conditions. The candy may reach the consumer in almost a liquid instead of a solid state. Ideal is a 15.8% reducing-sugar content.

A combination of excessive moisture and reducing sugars may also result in a condition known as "grain-

Careful Testing: From ingredients . . .



LABORATORY-CHECKING of incoming raw materials makes certain that they meet rigidly established specifications. Technician is cook-testing sugar.

. . . and packaging supplies . . .

EVALUATED here are candies wrapped in different packaging materials. Samples are being gaged for moisture pick-up in accelerated-humidity cabinet.

. . . to final product

DAILY PRODUCTION samples get regular inspection. Taken from "candy morgue," where shelf-storing is simulated, they are sharply checked on score of shelf stability, including appearance and graining.

ing off". Actually, the candy crystallizes, starting with a thin outer layer until it slowly transforms from essentially a glass-like to a completely crystalline structure. In this case, the candy takes on a coarse, grainy texture, with an uninviting, color-speckled appearance suggestive of stale merchandise. Wanted is a hard candy appearing similar to glass, but composed of a mixture of fused carbohydrates.

If, on the other hand, no crown syrup were added, then a fragile hard candy would result. It would chip and break during handling.

Much of what has been remarked about the quality of cough drops applies still more to fruit drops. Good appearance in fruit candies comes high on the list of requisites. The candy should have clear sparkle and bright color—but not of an intensity to suggest artificialness or of a concentration to leave a marked coloration on tongue and lips. Precaution must be taken to avoid graining off, with its detrimental effect on appearance and texture. • It's essential to get a smooth, even texture, amounting almost to slickness.

Bringing Out Flavor

Unlike cough drops, fruit candies should dissolve rapidly, giving an almost instantaneous flavor response. This speedy, even solubility is as important as flavor in the overall impression. Solubility is influenced by the candy formula—proper proportioning of corn syrup, invert syrup, and sugar.

For fullest effect of flavor ingredients, the candy base should (except for its sweetness) be as flavorless as possible. This near-neutral flavor serves not only to bring out the best in the flavor principles, but also to deter development of off-flavor during storage.

Just as the finest flavor qualities are enhanced, so too are minute traces of off-flavor emphasized by a high-quality candy base. Hence, flavor ingredients must be of highest quality. Discriminating use of these ingredients is no less important than their initial careful selection. Employment of excessive quantities of fruit acids to compensate for niggardly use of flavor is objectionable. These acids should sharpen, rather than replaced, other flavor ingredients.

Yet too much flavor also may be harmful. Citrus oils may become harshly astringent, and grape or wild cherry flavors may take on a sickening sweet taste. Between the two extremes—too little or too much flavor—a careful balance should be attained. And maintained.

Just as with quality, what has been said about shelf-life of cough drops applies to an even greater extent to fruit-flavored candies. Flavor and appearance of fruit candies—both end-products of delicate adjustments—are greatly influenced by subsequent atmospheric changes. Naturally, good, protective packaging is essential in maintaining quality.

At the F & F plant, packaging problems have received careful consideration. Thorough laboratory examination of packaging materials and extensive field-testing of finished packages are daily routines. Conventional laboratory weathering tests, going on over years, have enabled us to select

and apply materials making up a highly-protective package.

Now let us consider specifications set up for raw materials used to manufacture cough and fruit drops:

All ingredients going into the medicinal formulation for F & F cough drops must conform to U.S.P. standards. Here, establishment of specifications and tests follow prescribed procedures that offer no major problem.

Need for Ingredient "Specs"

But with fruit drops, the problem of ingredient-specifications is more complex and, to some extent, influenced by the manufacturing process. For example, sugar quality has a bearing on the performance of the candy cooker. Sugar, despite its general high purity by ordinary standards, varies widely as to cooking quality. Influencing cooking quality are degree of foaming in kettle, color formation, and sugar inversion.

Yet, the stress put on any one, or even all, of these factors will be largely influenced by equipment and process variations. Ordinary chemical procedures are either strictly limited or wholly inadequate in attempting to assay quality based on such factors.

True, certain impurities are believed accountable for some of the vagaries in sugar behavior. But even if any specific property were distinctly attributable to some definite impurity, quantities involved are too minute to be of any practical assay value where only the usual laboratory facilities are available.

It is impractical, if not impossible, to even attempt to break down the overall cooking quality of a sugar into its several components and assay each on the basis of chemical analysis. Hence, a purely empirical method—a "candy test" based on the behavior of a small candy cook—has been devised. This is now widely used in candy plants and sugar refineries for rough evaluation of the cooking value of sugar. Moreover, with some modifications a scoring system may be used.

So, although not fully satisfactory, the test has been used with some success in setting up specifications for sugar.

Ingredient next most widely used in candy manufacture is corn syrup which, despite its more complex composition, can be standardized to a greater extent than sugar. Offered are several grades, with clearly specified, easily measurable properties, such as reducing-sugar content, specific gravity, and viscosity.

In addition to these basics, the individual manufacturer may include such other prime specifications as color and pH—both essential if uniformity in processing of hard candies and finished products is to be obtained.

Rating Flavors

Considered best by F & F for evaluating flavors is gaging by nose and mouth. Certain special tests, such as standard syrup solutions and experimental laboratory cooks, are invaluable. But even in these cases, results cannot always be depended upon to be directly transferrable to a production scale.

In the improvement of old flavors and the development of new ones, an important adjunct is the methodical use of taste-jury opinion.

True, the jury surveys are arduous and expensive, and their proper utilization requires careful selection and cautious conclusions. Nevertheless, their benefits are indisputable and, at F & F, no flavor development is considered adequate unless it is buttressed by thorough taste-jury testing.

For instance, it is not uncommon to find two peppermint oils apparently identical within reasonable limits by laboratory test. Yet one will answer the purpose perfectly, whereas the other is completely unacceptable. Prepared synthetics can be even more difficult. Upshot is that the selections must be made by organoleptic tests.

Close cooperation with the sales department is also felt an absolute necessity in the developmental work. Since the salesmen are, in a manner of speaking, the eyes and ears of development, frequent consultation with them is deemed pertinent at F & F.

As part of the economy of any process, the inter-factory transport of raw materials or finished goods is important. Here, the relatively small amount of material involved in flavorings or medicine offer little difficulty. However, since precise control and allocation are significant, exact routing and final disposition must be carefully planned.

Handling the "Littles"

Raw materials for the medicine in our cough drops are delivered directly to the medicine laboratory. The liquids are then stored in closed, overhead stainless steel tanks. Solids are kept in original sealed containers until needed, and a careful check is kept of batch number and delivery date so that full data on materials on hand are always available.

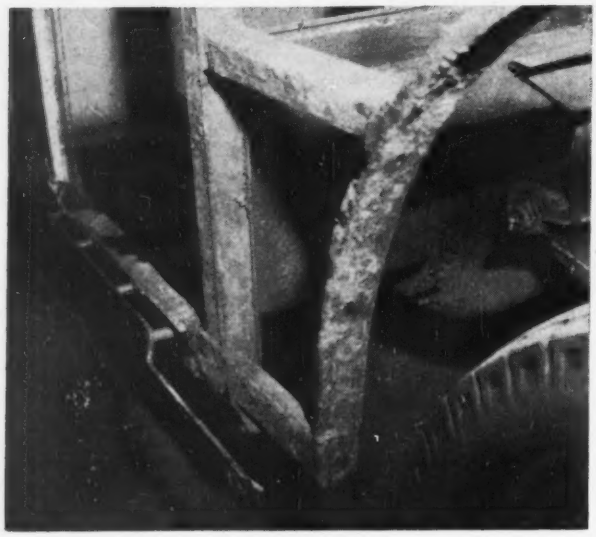
To facilitate movement and weighings of ingredients during formulation of the medicine, the laboratory is equipped with overhead, motorized, monorail conveyors. Medicine is mixed in 100-gal. stainless steel tanks, each mounted on large casters and equipped with a propeller-type agitator. After formulation, tanks are wheeled into the candy room, where agitators are readily hooked up to wall outlets to insure uniformity of the medicine as it is used.

Control Over Flavor and Color

Handling and preparing of colors and flavors for fruit drops entail a more complicated procedure. Reason

(*Turn to page 156*)

POSSIBILITIES of making color or flavor errors in the candy room are curbed by preparing the batches of these prime ingredients in a separate laboratory. Enough flavor for a batch is filled into aluminum-covered polyethylene containers that are stored (photo) on portable 5-rack shelves.



CORROSION played hob with frames. Arrow (right) shows torch-cut to remove rust-eaten sections.

Truck Bodies Last Twice as Long

—when they're re-engineered against rust . . . What's more, repair costs are cut, maintenance tasks are minimized, and refrigerant conserved

FE STAFF

Plain fact of the matter was that the standard bodies of the retail-route milk-delivery trucks used by Abbott's Dairies, Philadelphia, weren't "taking it." They had to undergo costly major repairs, or actually be replaced, about every three years.

This was the situation back in the mid-1940's. But no longer. Today, there has been adopted a system of using redesigned, specially engineered body sections. And the dividends have been striking:

- **The rebuilt units are lasting seven or more years.**
- **Thus, body-repair costs have been cut to less than half.**
- **And also halved is the time a truck is tied up for body maintenance.**

In addition, truck operating costs have been reduced. For the new-type bodies are far more sanitary and hence require less cleaning than the old models. Furthermore, there is a saving on refrigerating ice, much less being needed to adequately cool loads.

Deterioration of the original bodies was due to corrosion brought about by melting of ice, which was packed around and on top of cases of milk to keep them cool during delivery.

Immediately after a truck is loaded with cases of milk, flake ice from a Link-Belt ice blower was piled on top of the cases. But in the old method, the refrigerant overflowed the top and filled the space between the outer cases and the sides of the body and also between cases and rear panels of the body and the rear doors.

The layer of ice against the metal sides and ends of the body caused atmospheric moisture to condense on the outside. In turn, this daily sweating caused paint to peel and decals to deteriorate rapidly.

Also, melting ice trickled through the truck floor, rusting it and corroding all metal parts beneath.

Now when a truck with a rusted body goes to the body shop, all corroded panels are removed. Then all corroded framework is cut away and replaced.

Next there is laid over the floor and wheel boxes a 1-in. layer of Rubbertex insulation. Side panels and back quarter panels are also insulated. Here Ultralite is the material, laid to a height of a few inches above the level to which the flake ice rises when blanketed over the load of cases.

Floor on top of insulation, made of 14-gage steel waffle plate and welded into a unit, has ends and sides flanged up to form a water-tight pan.

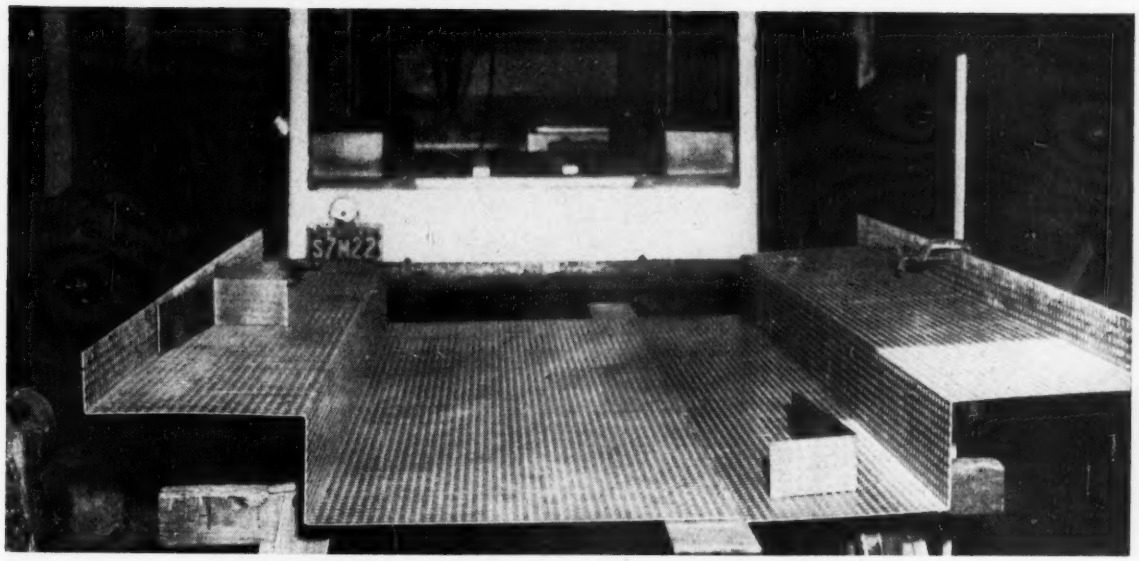
Adequate drainage for melted ice is provided by four drain tubes, which are welded to the pan bottom and which extend below the chassis of the truck.

When the welded steel pan is in place over floor and wheel boxes then inside panels of 22-in. gage Galveneel are installed over side insulation flush with the body framework so as to lap over sides of the flared up floor pan. Also back corner panels are squared up.

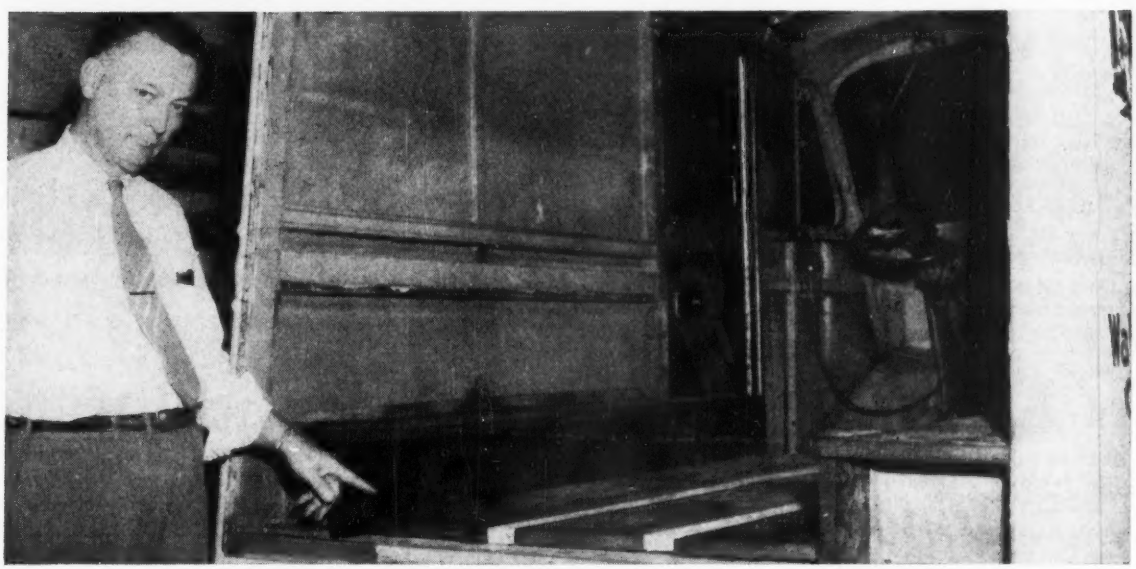
These inside changes were planned so as to make interior body dimensions exactly five cases wide, four cases long. Now when ice is blown on the load it can only stay on top and drip down through the load as it melts, eventually to find its way out through drain tubes.

Thus the framework of the body stays dry. No condensation forms on the outside truck panels, since they are protected by insulations from contact with the ice. And so the load on the paint shop is eased.

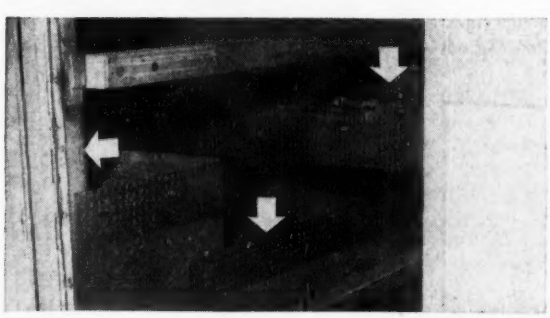
With the rear doors installed, there is some small space between cases and rear doors that cannot be avoided. Nevertheless flake ice is prevented from entering this space by shelves attached to the rear panels and to the doors, just below window level.

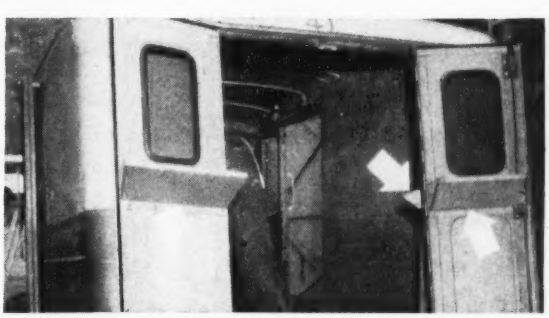


NEW FLOORING of steel waffle-plate is welded as single unit. It slides into place through rear of body, where it fits over . . .



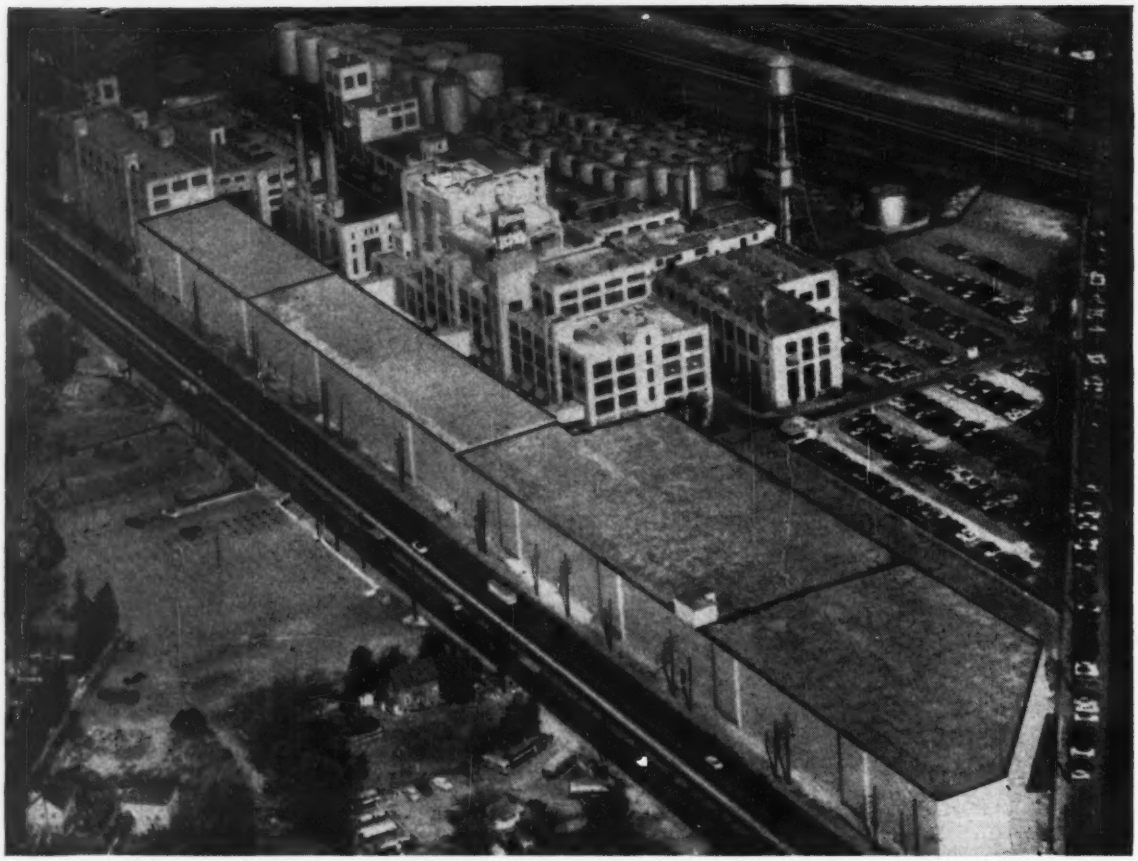
. . . **1-IN.-THICK** Insulation blanketing wheel boxes and flooring. This eliminates condensation that formerly ruined body paint jobs.





TWO SPECIAL FEATURES further curb moisture inroads. Left: Truck floor gets pan-like flanging (arrows) to contain water from melting ice and discharge it below chassis. Right: Baffles (arrows) on rear panels and doors prevent flake ice from sifting down between cases and rear end.

New Gigantic Warehouse . . .



QUARTER-MILE LONG warehouse conveniently snuggled against plant-processing buildings. Combination 2- and 3-story structure serves as distribution center for Lever products in a 28-state area.

Automatic Materials Handling

Brings Surer, Speedier Deliveries

Streamlined facilities in new Lever warehouse feature almost a mile of conveyors, specially designed electronic sorting system, accumulating lines, fully automatic case palletizers, and mechanized pallet load elevator

FE STAFF

"Let me give the manufacturer's view," said beaming Executive Vice President R. C. Waehner at the recent dedication of Lever Brothers's new, quarter-mile long warehouse at Hammond, Ind:

"The advanced facilities we have here mark a pacesetting step in product warehousing. This vast warehouse, containing nine acres of floor space, will serve as a distribution center for Lever products sold in a 28-state area."

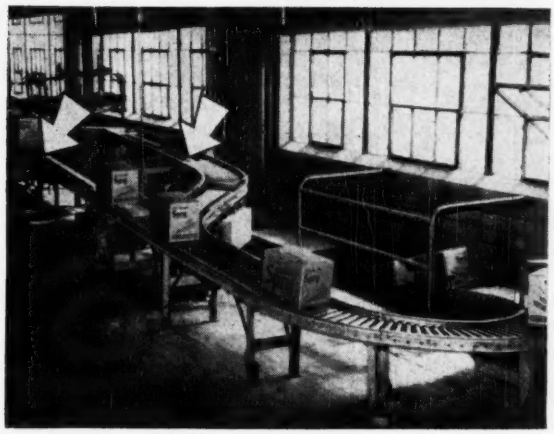
"And," added Plant Manager W. E. Oyler, "this is one of the first big warehouses to adopt full mechanization specifically designed to assure economical operation, speedy delivery of goods, and better protection of product and package."

"I've got something to say, too," cut in F. J. Lunding, chief executive officer, Jewel Tea Co., Inc., Barrington, Ill. "For the retailer, it's bound to do a whale of a lot. We should be able to up our total profits, because this ultra-speedy service will provide us with a greater turnover of Lever products in our supermarkets."

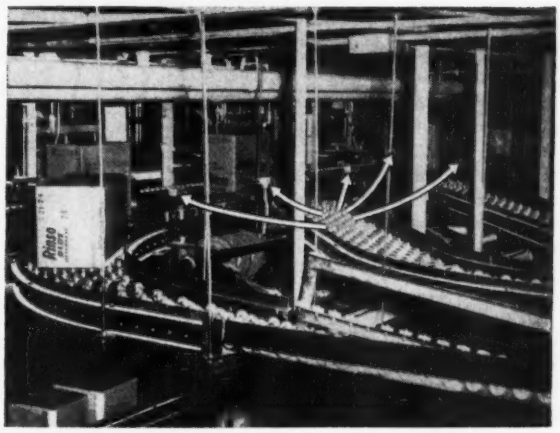
Down to Details

To get the picture of how the mechanized facilities in this efficiency-

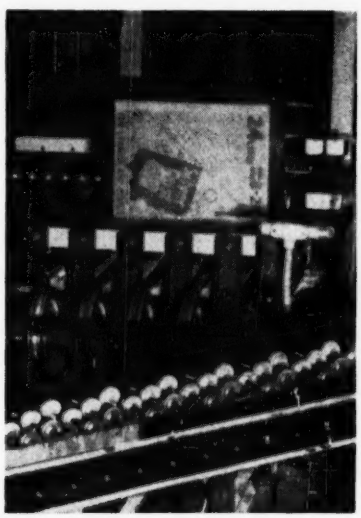
. . . Specializes in Robot Operations



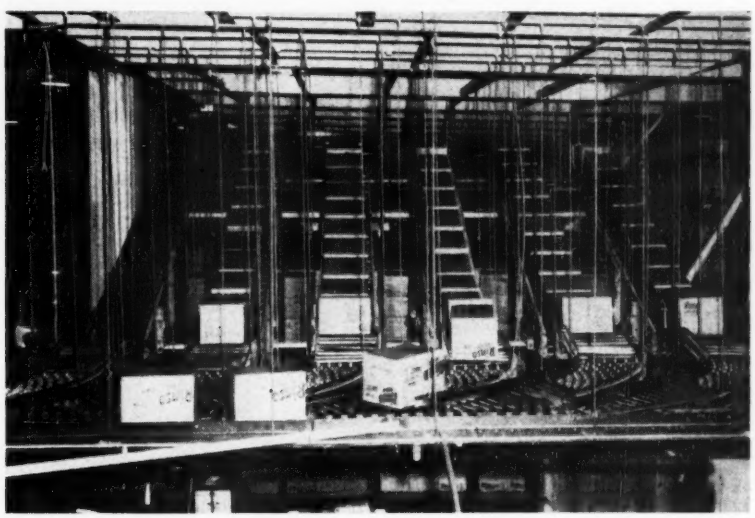
1 FIRST STEP in warehousing operation: Cased goods leave automatic gluer and sealer, pass over check-weighers (arrows) on way to warehouse.



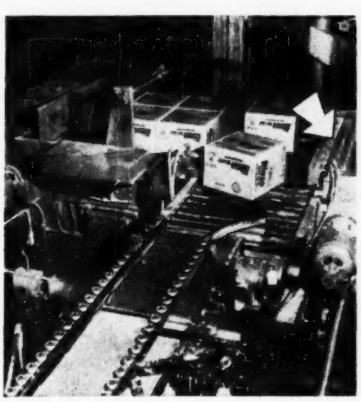
2 CASES then are sorted onto six accumulator lines by electric eyes (arrows). Keying stripes, printed in varying positions on cases, actuate the eyes.



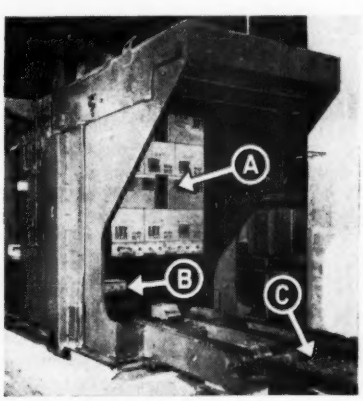
3 IN SWITCHING, V-belts rise between main-line rollers to pick up carton and move it onto spur line.



4 THESE are accumulator lanes, where cases are classified into like kinds and sizes prior to palletizing. An automatic device successively scans lanes to determine if there are enough cases for pallet loads.



5 ON TOP of palletizer, powered rollers line up cases in rows. Then loader's ram (arrow) pushes cartons into layers going on pallets.



6 IN MACHINE PALLET (A) starts down. Next load will be formed on pallet (B). They move out and onto conveyor (C).

7 HERE fork-truck can take pallets —after breaking beam (arrow) to stop conveyor. Or Lowerator (as shown) drops them to ground floor.

plus warehousing will help processor and retailer, let us start the story at the beginning.

First, building details: The warehouse was constructed of pre-cast concrete walls, and it was designed to conform with floor levels of the adjacent plant-processing buildings. One-half of the building comprises three stories, the other half two. In addition to warehousing space, there is a refrigerated holding room for margarine, as well as a tempering area for homogenized shortening.

To rush products out of the warehouse, 28 loading bays have been provided for trucks and, in addition, there are rail freight docks in the warehouse itself for loading or unloading of 28 cars.

The company went all-out in installing what is perhaps the most advanced and efficient of materials handling systems. Now down to points:

There are three separate conveyor systems—totalling 4,750 ft.—for canned shortening and packaged margarine, cartoned powdered soaps and detergents, and wrapped soap bars.

Simplicity of the new operation is striking. Typical is the impressive method of automatically handling powdered soaps and detergents—a system that can easily be borrowed by those in the food industry who handle a variety of cased goods.

Here's how the system works: Cartons enter the second floor of the warehouse from the various processing locations via powered conveyors bridging the space between the plant and warehouse. The various product conveyors all merge into a single line where the cartons become indiscriminately mixed. On this single line, the mixture of cartons is carried to a central point in the new warehouse, where the sorting, palletizing, and storage operations take place.

Unless the cartons are to be shipped immediately—in which case they are shunted to a bypass conveyor and thence move by spiral chute to the shipping dock on the first floor—the products go into inventory through the automatic sorting, palletizing and vertical transfer equipment.

Automatic Sorting Devices

Keying the warehousing operation are the automatic sorting devices, which separate the cartons into six product groups. The sorting is accomplished by a series of six electric eyes along the main conveyor line, each set to respond to the position of a mark on the side of the carton. Each type

(*Turn to page 158*)

● ● ●

SEEN IN ACTION on potatoes, prepackager will handle many different items in various types of bags. This is the 1,000 bag/hour model. Two men man it (note second operator behind machine).

Prepackaging Sped by Filler-Weigher

Cite cut in man-hours to 50% . . . Output in range of 1,000-2,000 bags hourly

A LABOR-SAVING prepackaging machine that can weigh and fill products in consumer-size sacks or bags at a rate of up to 2,000 hourly has been developed by D. B. Baker, veteran Washington produce wholesaler.

Operating a half dozen warehouses in the Columbia Basin and Yakima Valley, under the name Baker Produce Co., Mr. Baker put his mind, several years ago, to the development of the machine in question. And today, having "proved it out," he has set up the separate Baker Machinery Co., at Kennewick, Wash., to make and purvey the new unit.

Offered in two models—one with a capacity of 2,000 bags per hour and the other 1,000 bags—the machine's basic components are a loading elevator, which can be regulated according to the size of the bag, plus bag holders suspended from individual scales rotating around a frame.

Both models include a 2,000-lb.-capacity supply bin and conveyor belt connecting with the loading elevator.

The larger machine requires a crew of four (trained in about two weeks), while the 1,000-bag-per-hour unit can be operated by two people. Baker says a saving of up to 50% on labor costs is achieved with his prepackager.

Working Details

Washed and graded produce is loaded into two bags at a time by the loading elevator as the bag holders rotate around the frame. The bags are secured to holders by slipping them up over a set of shoes and tripping rubber tipped clamps to hold them in place. When the bag reaches the conveyor belt leading to the closing equipment, a cam mechanism releases the bag.

It is stated that the bag holders will handle mesh, paper, or polyethylene bags. For paper or plastic bags, the clamps are used. For mesh bags, a drawstring is secured and the clamps are dropped out of place. The holders are adjustable to sizes from 3 to 10 lb.

With the supply bin filled, the bags are attached to holders as they move along a conveyor belt toward the loading elevator. The belt has heavy duty rollers and self-aligning ball bearings. Attaching the bags requires from one to two people, depending on skill of the operators.

After holders move past the elevator and filling is completed, the bags are checkweighed by another operator. When necessary, sufficient allowance is made for shrinkage. Over 90% of the bags filled require no adjustment. Checkweighing is simplified by the fact that the scales are always in full view.

Conveyor belt, loading elevator, and bag holders are operated by electric motors through a variable-speed V-belt drive. Movement can be synchronized through a single simple control panel on the machine. Maker reports that this panel can be serviced by any competent warehouseman.

STERILIZED jars passing through filling machine are protected from drip by speedy application of wipers.

CONVENIENTLY out of the way, box of wipers is yet readily accessible to take up excess margarine spillage.

PAPER SHOWS CLEAN-UP POWERS

New wiper proves it can "take it" in less than 90-day on-the-spot test . . . Sells both workers and management

LOUIS FEINBERG
Foreman, Sanitation Department,
Kraft Foods Co., Chicago

Suppose you were offered an exceptionally simple means of improving your plant's sanitary conditions, boosting housekeeping, raising employee morale and performance—and even giving added promise of pushing back operating costs.

And suppose it was further shown that you could get these benefits without in any way slowing production or lowering efficiency.

Likely you would consider all this very attractive—as did our organization, Kraft Foods Co. of Chicago.

At our plant, the problems encountered are similar to those faced by thousands of other food manufacturers. Naturally, we strive to keep these problems well defined. But even so, a specific situation may sometimes "elude the perspectives."

The Wiping Problem

Take the field of wiping. Here, we hadn't thought we had a problem at all. For many years we had been using expensive materials for many of the wiping jobs that must be done in our plant. We knew that they were quite costly. But that didn't, necessarily, seem to constitute "a problem."

Then someone called our attention to a new item for carrying out this kind of cleansing—a paper "napkin" designed especially to meet the general wiping needs of the food industry.

"New Approach"

This new product is the result of extensive testing and research aimed to create a handy, easy-disposable industrial wiper that is, at once, highly absorbent, yet extra strong, and also versatile for a variety of applications.

The new wiper, brought out by Scott Paper Co., is particularly cited for its special surface, fabricated for optimum cleaning action and dirt retention. Each wiper consists of two sheets that are bonded together (by the "Perf-Embossing" process) for additional durability. Further, the material has been given wet-strength properties.

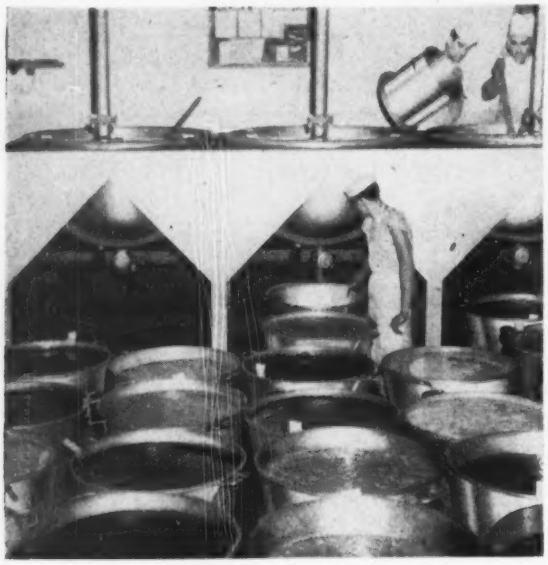
WORKER'S PERSONAL sanitation practices are promoted by the new wipers, says Author Feinberg, seen here freshing up. Hand and face wiping, it is pointed out, can account for 60% of wiping in a plant.

It wasn't difficult for us to see that this paper cleanser offered us a new approach to such wiper problems as high unit cost, expensive handling, erratic performance, and the shrinkage, pilferage, and laundry losses so common when other materials are used. All these factors contributed to our adoption of the wiper.

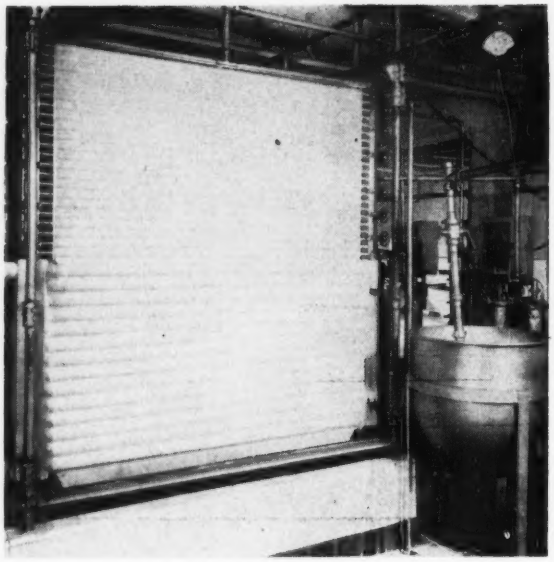
The new cleansers also give other advantages: The light, compact box in which they are supplied takes up a minimum of space in the work area and provides each employee with an instant, portable source of wipers when and where needed. Each box also has a "pop-up" feature that automatically brings each new wiper to ready grasp without finger-fumbling.

Moreover, each of our workers thus has fresh, sanitary sheets that are ideal for cleaning of hands, face, or glasses.

(*Turn to page* 176)



DOES TOP JOB: . . . in the bakery



. . . the dairy

ALUMINUM IN THE FORE

Widely Used in Handling and Packaging It's Now Coming Up Fast in Processing

Here's where, why, and how . . . Metal's characteristics of lightness, strength, corrosion resistance, and thermal conductivity . . . Line applications

FLOYD A. LEWIS
Editor, The Aluminum Association, New York City

Today's food engineers are finding ever increasing uses for aluminum on their lines.

This metal's unique combination of properties quickly won it broad acceptance in materials handling and packaging operations. And now, these same properties are bringing it to the fore in processing equipment.

Available in a wide variety of forms, aluminum affords high resistance to corrosions incident to food products and ingredients. It has no harmful effects on foods nor on consumers of foods prepared or packed in aluminum equipment or containers.

The metal's sanitary advantages are of obvious importance. It has a smooth, easily cleaned surface which is nonabsorbent and which does not harbor bacteria.

Competitive relationships between aluminum and other materials have changed considerably in recent years. The cost of aluminum today is only a little higher than it was in 1939. Its use has become economical in many applications formerly considered unfeasible.

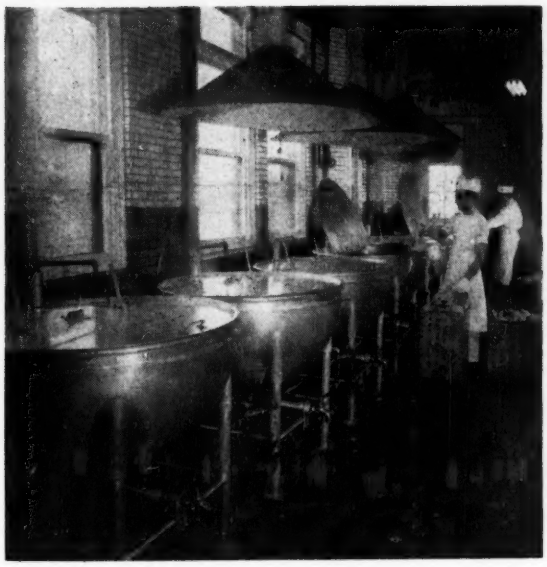
Not all aluminum alloys are suitable for use in the food processing field. Alloys such as 3003, 3004, 5050, and 5052, which contain controlled amounts of manganese or silicon and magnesium, give good performance in contact with numerous food products. Commercially pure aluminum is also useful in this field.

Where higher strength and other superior mechanical properties are required together with high resistance to corrosion, a clad material is often used. A thin coating of either pure aluminum or an alloy having a high resistance to corrosion is applied to the surface of a high strength alloy, becoming firmly bonded during rolling. Clad sheet or plate thus has the mechanical characteristics of the core alloy, but the possibility of perforation due to the corrosive action of certain foods is minimized through the protection given by the cladding material. Tube and pipe also are available in clad form.

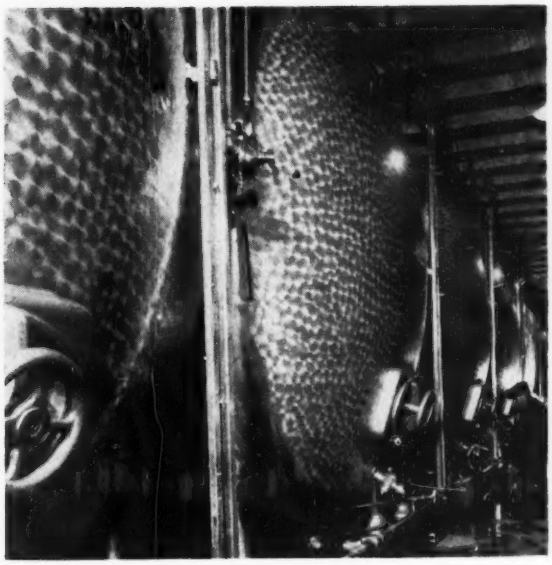
Characteristics Cited

Although aluminum's light weight is perhaps its best known single characteristic, other properties are of greater importance to the food industry. The first requirement of any material used in direct contact with a food or ingredient is that there be no reaction that would make the finished product harmful in any way to the consumer. Aluminum meets this requirement in its entirety.

Ever since the early days of the industry it has been known that the metal does not impart any toxic effect to foods. Numerous investigations—by the aluminum industry, in food laboratories, and by medical authorities—substantiate these statements. A comprehensive annotated bibliography of published material on this subject



. . . the poultry plant



. . . the brewery

was issued by the Mellon Institute of Industrial Research in 1933.

Closely akin to the metal's nontoxic characteristics is its high corrosion resistance. A thin invisible coating of aluminum oxide which forms immediately upon the surface of the metal when exposed to air, or other oxidizing elements, usually protects the metal from further attack. Of course, any substance which would damage this film may permit attack on the metal.

Most food products are either neutral or only slightly acid and have little effect on aluminum. Certain combinations of acid foods and salts are corrosive to the metal, but many foods containing such combinations also include colloids, fats, or sugars which inhibit the corrosive effect of acids and salts. Other factors influencing the corrosive effect of a given food are duration of contact with the metal, temperature during contact and presence or absence of oxygen.

Related to aluminum's high resistance to corrosion is its nonstaining characteristic. Color is one of the factors influencing salability of food products. It is thus important that no material be used that will impair the color. Even where minute amounts of aluminum salts may be formed as a result of the action of certain food products with the metal, these salts are colorless, don't stain product.

High thermal conductivity is another of the metal's characteristics useful in food processing. Many operations involve cooking, and others require refrigeration. Aluminum is an efficient material to employ for both types of equipment—in fact for any type of heat exchanger or other unit involving the transfer of thermal energy from one medium to another.

Light weight has advantages in the food industry, as it has in practically all applications of aluminum; for it makes equipment easy to handle and install. It is particularly important in materials handling equipment where weight saving means improved efficiency.

A high degree of workability makes aluminum easy to use. The metal is available in all common forms—sheet, plate, extruded, rolled and drawn shapes, tube and pipe, castings, forgings, foil, powder, and paste. It can be joined by several methods, including welding, brazing, riveting, and bolting.

Its nonsparking property is valuable in plants where potentially explosive dust or gaseous atmospheres may collect. Even its high reflectivity is useful. Because the metal reflects a high percentage of the sun's rays, outdoor aluminum storage tanks keep the contents cooler than tanks made of less reflective materials—especially important with volatile liquids.

Many Food Applications

Aluminum equipment is now at work in dairies, breweries, and plants processing breakfast cereals, soups, and other prepared foods. It is found in canning, bottling, and preserving plants, also gelatin factories, and bakeries. Further, aluminum is used successfully in equipment for producing fats and edible oils as well as acetic acid and vinegar. It is used, too, in many processes involving fermentation reactions, since the metal has little effect on fermentation catalysts.

Plant equipment in which aluminum is commonly found includes vats, storage tanks, kettles, pasteurizing equipment, cookers and coolers, refrigeration equipment, piping and valves, and materials handling items such as drums, barrels, tubs, pails, trays, and trucks.

In spite of its versatility, aluminum is by no means useful for every kind of food equipment, with every type of product, or under all processing conditions. As a matter of fact, special precautions should be observed when using it with certain types of products.

In food processing plants, as with other applications, care sometimes must be taken to avoid possible galvanic corrosion. Where aluminum is in contact with some other metals in the presence of an electrolyte, galvanic corrosion is likely to occur. When aluminum must be joined to other metals under these conditions, some means of insulating the two metals must be provided if this type of corrosion is to be avoided. Most effective solution is the use of an insulating joint.

Producers of aluminum and aluminum alloys have available a great deal of information on the reactions of all types of processed foods on the metal and its alloys. When a new application, or a use of the metal under new conditions, is being considered, difficulties often can be avoided by drawing upon this storehouse of information which has been accumulated both experimentally and in actual operation over the years.

Behavior of aluminum with some of the most common types of food products is discussed in the following

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sections of this article. Products and processing conditions for which aluminum equipment is not considered most suitable are discussed, as well as the more numerous cases in which the metal has proved eminently satisfactory.

About Fruit Uses

Cold fruit juices have little effect on aluminum, so the metal safely may be used in contact with practically all types of fruit juices where heating is not involved. Acid juices, such as lemon, are more corrosive to aluminum than nonacid juices like apple and grape. The extent to which fruit juices react with aluminum depends partly on the dilution, the more dilute juices having a more pronounced etching effect. Any contamination of fruit juices with even small amounts of heavy metals prior to contact with aluminum may cause galvanic corrosion.

As stated, sugar acts as a corrosion inhibitor, which accounts partly for the highly successful use of aluminum equipment in the processing of jams, jellies, and preserves.

Most fruit juices suffer no change in color when processed in aluminum equipment. However, some fruit colors are reduced by long standing in aluminum vessels in the absence of air.

Although it has been found that pasteurization of fruit juices in aluminum vessels does not lower the vitamin C content nor impair the taste of the majority of fruit juices, the metal should not be used in contact with either hot citrus juices or hot apple juice.

Metal Data Compared

TABLE I—of Aluminum Alloys Used in Food Processing Equipment

Alloy			Tensile Strength (Psi.)		Density (Lb. Per Cu. In.)	Thermal Conductivity (Btu./In./Ft.²/Deg. F/Hr.
Aluminum Assn. Designation	Old Commercial Designation	Temper*	Ultimate	Yield		
1100	2S	0	13,000	5,000	0.098	1,540
		H12	16,000	15,000		
		H14	18,000	17,000		
		H16	21,000	20,000		
		H18	21,000	22,000		1,510
3003	3S	0	16,000	6,000	0.099	1,340
		H12	19,000	18,000		1,130
		H14	22,000	21,000		1,100
		H16	26,000	25,000		
		H18	29,000	27,000		1,070
3004	4S	0	26,000	10,000	0.098	1,130
		H32	31,000	25,000		1,130
		H34	35,000	29,000		1,130
		H36	38,000	33,000		1,130
		H38	41,000	36,000		1,130
5005	(A50S) (R30S) (K155)	0	18,000	6,000	0.098	1,390
		H12	20,000	19,000		1,390
		H14	23,000	22,000		1,390
		H16	26,000	25,000		1,390
		H18	29,000	28,000		1,390
		H32	20,000	17,000		1,390
		H34	23,000	20,000		1,390
		H36	26,000	24,000		1,390
		H38	29,000	27,000		1,390
5050	50S	0	21,000	8,000	0.097	1,340
		H32	25,000	21,000		
		H34	28,000	24,000		
		H36	30,000	26,000		
		H38	32,000	29,000		1,340
5052	52S	0	28,000	13,000	0.097	960
		H32	33,000	28,000		960
		H34	38,000	31,000		960
		H36	40,000	35,000		960
		H38	42,000	37,000		960
5154	A54S	0	35,000	18,000	0.096	870
		H32	39,000	30,000		870
		H34	42,000	33,000		870
		H36	45,000	36,000		870
		H38	48,000	39,000		870
		H112	35,000	16,000		870
6061	61S	0	18,000	8,000	0.098	1,190
		T4	35,000	21,000		1,070
		T6	45,000	40,000		1,070

* 0 is annealed, H12 to H18 strain hardened, H32 to H38 strain hardened and stabilized, T solution heat-treated (sometimes followed by aging, by cold work, or both.)

TABLE II—Other Structural Materials Commonly Used in Food Industry

	Temper	Tensile Strength (Psi.)		Density (Lb. Per Cu. In.)	Thermal Conductivity (Btu/In./Ft.²/°F/hr.)
		Ultimate	Yield		
Copper.....	Hard	50,000	45,000	0.322	2,700
	Hot-rolled	34,000	10,000	0.322	2,700
Steel					
Structural.....	Hot-rolled	60,000	38,000	0.283	406
Nickel (3.25%)..	Hot-rolled	92,000	50,000		
Stainless 18-8...	Annealed	90,000	40,000	0.288	116
	Cold-rolled	150,000	125,000	0.288	116

Vegetable Applications

In general, the corrosive action on aluminum by vegetables is negligible, unless they contain free acids or have been made alkaline by addition of sodium bicarbonate. For example, cabbage cooked in vinegar is found to be more corrosive than nonacid foods. Whereas creamed cabbage has only slight action on aluminum, adding sodium bicarbonate to this product increases its action. Sauerkraut, which contains lactic acid, is more corrosive to aluminum than such nonacid vegetables as beans, beets, onions, and celery.

Tomato juice has little action on aluminum up to a temperature of 200 deg. F. Under these conditions there is no determinable effect on color or flavor of tomato products processed in the metal. Tomato products are considerably more corrosive to aluminum at boiling temperatures, however, so that products which require boiling (such as catchup), cannot be satisfactorily processed in aluminum equipment.

Vinegar containing 2.5% acetic acid has no appreciable effect on aluminum when cold. Therefore, aluminum vessels are used successfully for storing vinegar. Pickles and sauces containing both vinegar and salt, however, cannot be processed successfully in aluminum equipment because this combination may cause severe corrosion, particularly at boiling temperatures.

Meat and Meat Products

Because of the inhibiting action of its fat content, meat causes no appreciable reaction on aluminum. Therefore, equipment made of this metal is widely used in meat processing plants. Salt, which causes attack in the presence of acids with some foods, does not have any appreciable corrosive action on aluminum when introduced into meat products.

Aluminum has been found to be one of the best materials for equipment used in processing gelatin. Its smooth, sanitary surfaces minimize bacterial contamination, and its nonstaining properties are particularly advantageous with this pale-colored product.

But it is important to avoid acid impurities, which may attack aluminum equipment. Because of the presence of small amounts of salts and the absence of fat, aluminum containers are not ordinarily used for storing finished gelatin solutions.

Since aluminum is resistant to attack by fatty acids, it is widely used for equipment employed in processing and storing fats and edible oils, of both animal and vegetable origin, such as oleomargarine, lard, cotton-

seed oil, peanut oil, and palm oil. Unlike some other metals, aluminum does not catalyze the oxidation which promotes rancidity in some of these products and it does not discolor the product.

Fish and Fish Products

The same general considerations hold for fish and fish products as for meats. Thus aluminum equipment is highly suitable for processing practically all types of fish products.

One of the newest uses of aluminum in this field is on the boats themselves. Fishermen are attaining greater profits from their trade by freezing their catches right on the boat. In this way they can stay at sea longer and make larger catches without danger of spoilage.

Here, aluminum equipment means faster freezing and lighter weight, and the advantages of this sanitary material are obvious. Some of the largest fishing enterprises are now successfully operating vessels outfitted completely with aluminum.

Milk and Milk Products

Since aluminum is the most economical of the various metals and alloys having no detrimental effect on fresh milk, all types of aluminum processing equipment are found in the dairy field, including tanks, tank trucks and other containers, coolers, pasteurizers, churns, and piping. Aluminum is virtually unaffected by fresh milk at any temperature up to and including the boiling point. It has no effect on vitamin C content, even upon heating.

Sour milk attacks aluminum only slightly at room temperatures. Heating increases the action somewhat, but not as much as might be expected considering the lactic acid content. The fat and other nonacid substances contained in sour milk apparently act as inhibitors. The metal is equally useful in butter-making equipment. It has been used successfully with butter containing up to 8% salt.

Alcoholic Beverages

Essentially, alcohol has no effect on aluminum, and aqueous solutions of alcohol only a slight effect. Aluminum fermentation vats are in successful use in the manufacture of alcohol from molasses, having no detrimental effect on the color or stability of the yeast.

Extensive use of aluminum beer barrels provides ample evidence of the fact that the metal is not attacked by this beverage. There is no discoloration of beer and no impairment of flavor. As in the production of alcohol, aluminum fermentation vessels, as well as much other equipment made of this metal, are being successfully used in breweries.

Some of the strong alcoholic beverages, such as whiskey, brandy, and cognac, react with unprotected aluminum so that these beverages become discolored and flavor is affected. With liqueurs, the action is less pronounced because of the inhibiting action of the sugar content.

This metal has had but little application in the wine industry although it has been found suitable for fermenting vats, provided no acetic acid is present. Aluminum vessels can safely be used for transporting wines. But there is some danger of clouding or impairment of flavor if these beverages are stored in such vessels for long periods.

Coatings, Cleaning Equipment

Where the oxide coating which forms naturally on aluminum surfaces does not provide sufficient protection, the corrosion resistance may be increased by the application of a protective coating. A variety of coatings may be applied readily to the metal, and of course to be effective for any specific application the coating must be substantially unaffected by the material with which it will come in contact during operations.

The coating must also be strong enough to withstand the mechanical handling it will receive, and it should not be subject to deterioration on aging.

Most commonly applied protective coating is an oxide heavier than the naturally formed coating. Anodically applied oxide coatings are hard and abrasion-resistant, and they possess considerable resistance to attack by salt water. Certain alloys are made more resistant to milk and milk products by anodic coating. Baked phenolic resin lacquer coatings successfully withstand the action of organic acids and alkalis. One of the uses of such coatings is in the lining of tank cars for wine.

An important advantage of aluminum in food processing equipment is the ease with which it can be kept clean and sanitary. For many cleansing chores, a mild soap and steel wool, or some mildly abrasive cleaner, will suffice.

Copper wool should not be used, since this might contaminate the surface and cause galvanic corrosion. Coarse abrasives should not be used because these may harm the protective oxide film.

For many applications in the food industry, use of safe cleaning methods will make the difference between success and failure.

When not in use, aluminum equipment should be kept dry. Any pocket in the equipment that cannot be drained should be dried by blowing hot air or steam through it.

Dairy plants sometimes pose special cleaning problems. Some of the deposits formed on the walls of vessels are hygroscopic and should be removed.

Greasy films are quite common, too, in dairy equipment. But these can be removed with careful use of a mild abrasive together with a safe cleanser and plenty of hot water.

Strong alkaline cleansing compounds commonly used in food plants are highly corrosive to aluminum and should not be used except with a suitable inhibitor. Types of chemical cleaners that have proved satisfactory with aluminum are those containing sodium carbonate with additions of sodium silicate, sodium disilicate, sodium phosphate with additions of sodium silicate, and alkalis with the addition of protective colloids.

Formaldehyde cleansing solutions are safe with aluminum, since they have little corrosive effect on the metal. After cleaning, special care must be taken to avoid having the cleaning agent remain in crevices and corners.

Containers and Packages

The same general considerations apply in the use of aluminum for food containers and packaging materials as in processing equipment. Aluminum food containers are easy to handle, sanitary, long lasting, and require little maintenance.

Aluminum cans are being used successfully in Europe for packing some types of food products, notably fish, and their possibilities are being investigated in U. S. laboratories.

Aluminum foil and foil laminates are among the most useful packaging materials. They are odorless, tasteless, and impervious to extraneous odors and moisture. Their sparkle and eye appeal enhance the salability of hundreds of products.

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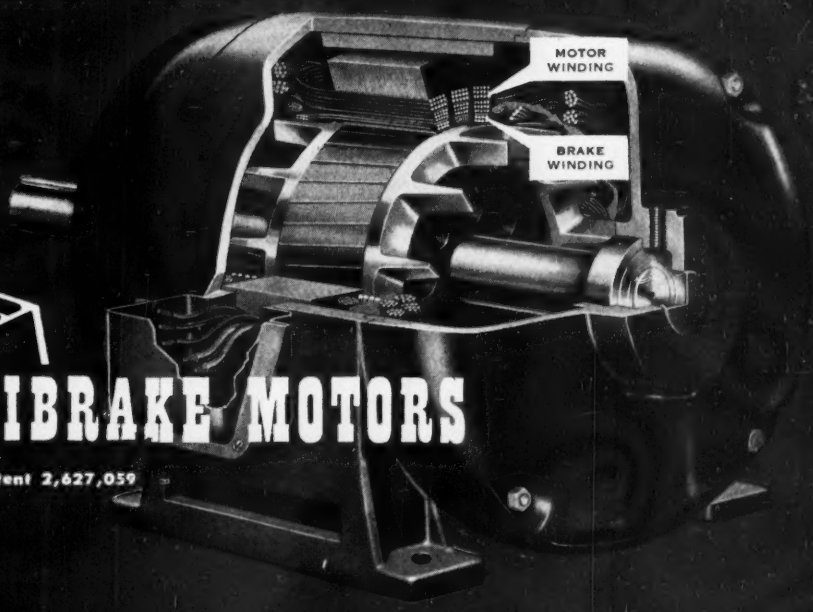

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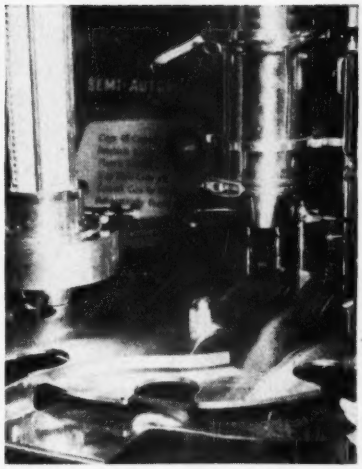
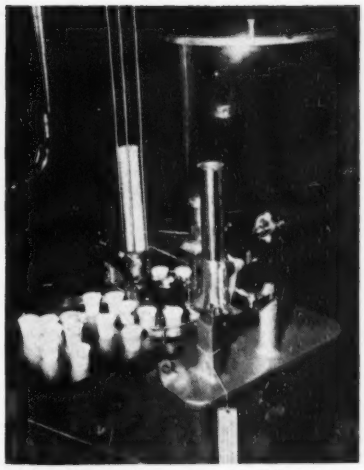
FILLING ¾ or 1-oz. cups, 120 per min., sealing with aluminum foil lids for positive protection are features of new straight-line unit: Standard Packaging Corp., Jersey City, N. J. (103A)



SMALL CUPS are accurately filled with ice cream, sherbet, cream, jelly, dressing and capped at high speed on new unit displayed by the Dixie Cup Company, Easton, Pa. (103B)



FAST dispensing, accurate filling, capping small cups with insert or coverall lids are possible with Model 60. Dispensers easily changed: Anderson Bros. Mfg. Co., Rockford, Ill. (103C)

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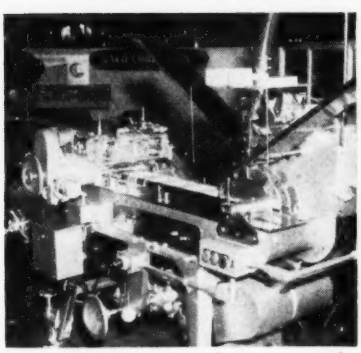
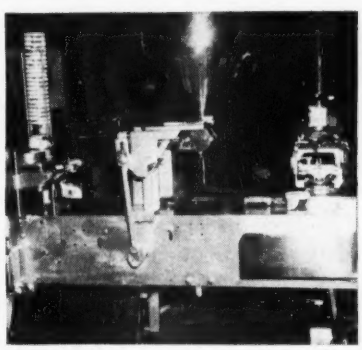
CUP-O-MATIC bulk milk vender holds two 20-qt. dispensing cans, delivers 160—8 oz., 183—7 oz. drinks, at rate of 6 per min. Employs gravity flow, throw-away plastic valve for measuring and dispensing milk: Food Eng. Corp., Manchester, N. H. (103D)



ICE CREAM sandwiches are made, wrapped, sealed at up to 100 per min. by new Lynch SMW. Vari-speed drive synchronizes operation with freezer capacity: Lynch Corp., Anderson, Ind. (103E)



STRAIGHT line cottage cheese filler dispenses, codes, fills, vacuum caps 30 containers per min. Easily converted to twin, doubled capacity unit: Triangle Package Machinery Co., Chicago. (103F)

PACKAGING CHEESE in film with controlled atmosphere to extend shelf life by Flex-Vac process comprises replacing air with inert gas then sealing: Standard Packaging Corp., Jersey City, N. J. (103G)

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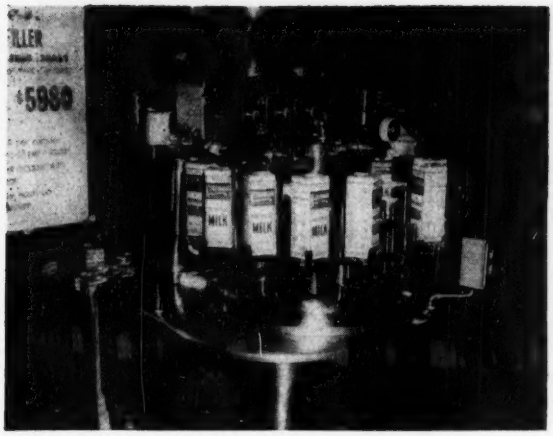
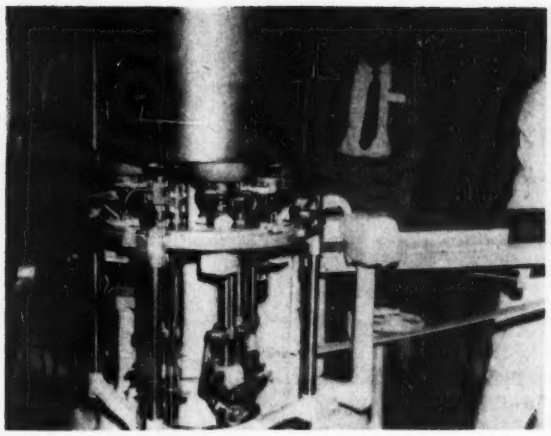
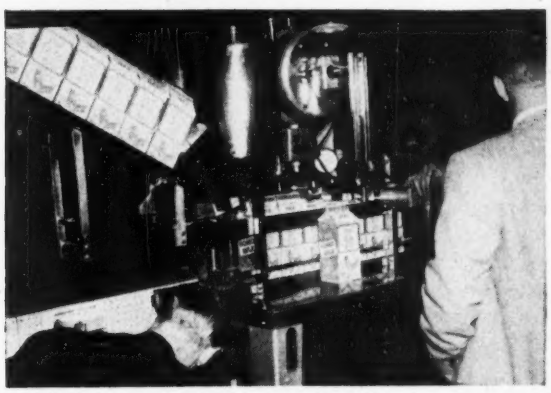


SMALL filler for Canco cartons has capacity of 24 qt. per min. Employs 4 filling valves, steam jet defoamer to eliminate foaming. Quickly changes to pt., ½ pt. and 1/3 qt. sizes. Also available for Sealking cartons: Triangle Package Machinery Co., Chicago. (105A)



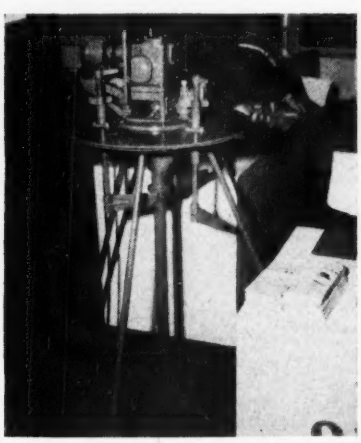
FULLY automatic Canco container filler has parallel infeed, discharge conveyors enabling 1-man operation at 25-30 qt., 35 pt. ½ pt. 1/3 qt. per min. Electric eye controls infeed, ejects improperly placed carton: Cherry-Burrell Corp., Chicago. (105B)

FILLER-SEALER for small dairies using nested, printed, paraffined, preformed Pure-Pak containers has capacity of 20 qt., 30 smaller size packages. Illinois Creamery Supply Co., Chicago. (105C)

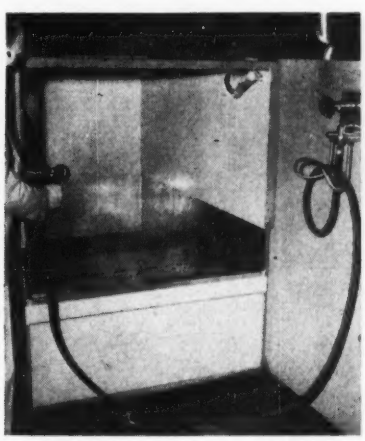


MAGAZINE feed, "push-through" type filler for preformed Pure-Pak cartons staples, discharges to accumulator. Speed: 10-2 qt., 20-qt., 30-½ pt. per min.: The Mojonnier Dawson Co., Franklin Park, Ill. (105D)

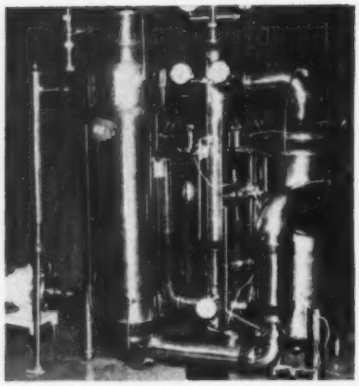
COMBINATION small parts washer, CIP supply tank cleans separator disks, fittings as solution is circulated through pipe lines by pump in base: The Schlueter Co., Janesville, Wis. (105E)



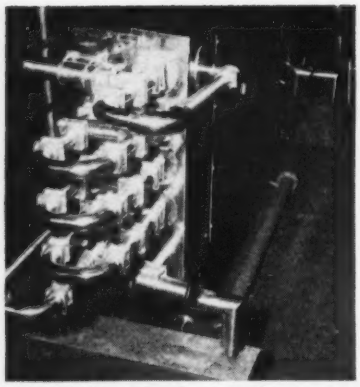
TANK cleaning unit automatically sprays hot solution over interior surfaces. Four nozzles on 3-ft. shaft rotate horizontally and vertically, on 3½ min. cycle: Oakite Products, Inc., New York. (105F)



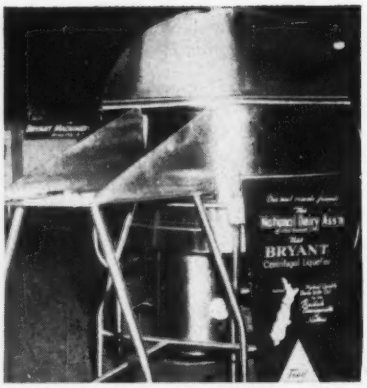
WATER SAVER nozzle (left) gives desired spray by varying pressure on lever, shuts off instantly. Rubber cover protects nozzle and equipment. Hanger (right) keeps hose off floor: Straham Valves, Inc., New York. (105G)



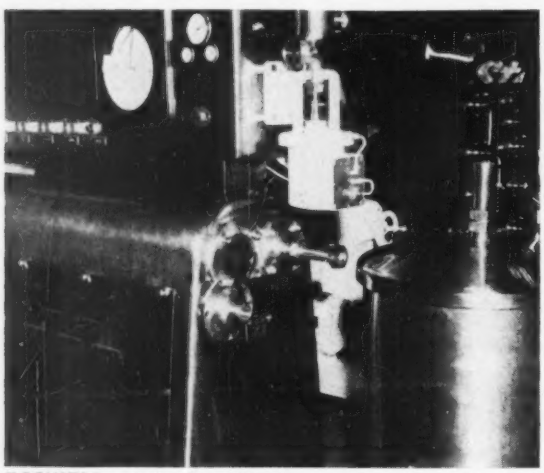
LARGE (25,000 lb. per hr.) vacuum pasteurizer for milk, ice cream mix, other dairy products, has safety controls approved by USPHS: Cherry-Burrell Corp., Chicago. (106A)



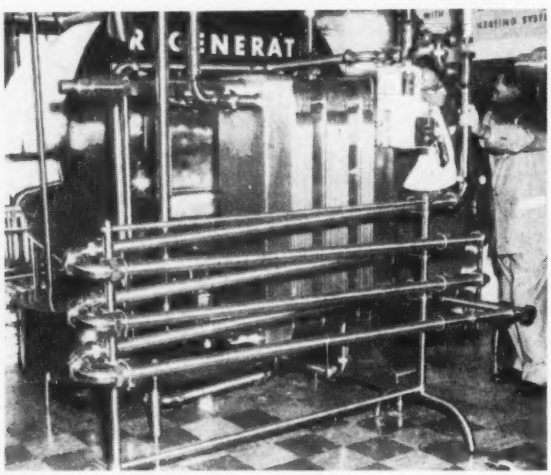
INTERNAL tube heat exchanger approved for CIP installations has Transeal sanitary fittings enabling visual inspection of gaskets: Eastern Dairy Equipment Co., Inc., New York. (106B)



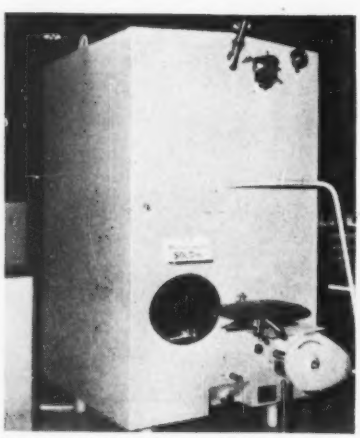
CENTRIFUGAL LIQUEFIER enables direct incorporation of butter or frozen cream in ice cream mix through quick melting: Bryant Machinery Corp., Jersey City, N. J. (106C)



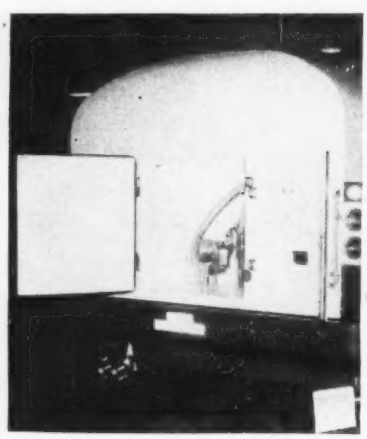
ROSWELL pasteurizer for ice cream mix, other dairy products effects speedy heating to 300 F. without cooked flavor. Regenerator (rear) cools in closed system: Chicago Stainless Equipment Corp., Chicago. (106D)



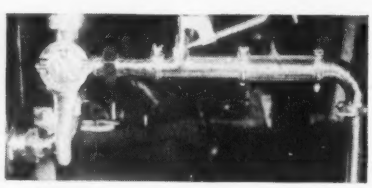
HTST pasteurizer employing new plate unit with vacuum-steam heating that combines high efficiency of direct steam with low temperature difference of hot water: The De Laval Separator Co., Poughkeepsie, N. Y. (106E)

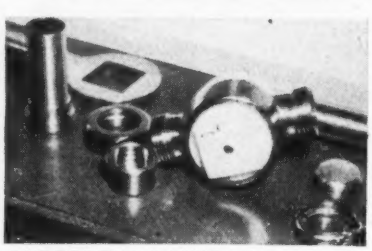


RECTANGULAR stainless storage tank increases capacity per sq. ft. of floor space, saves costly building expansion. The Pfaudler Co., Rochester, N. Y. (106F)



FARM pickup truck (1,500 gal.) molded of plastic in one piece weighs less than conventional tank trucks, requires no painting: The Heil Co., Milwaukee. (106G)





BUTTERFLY VALVE (top) permits perfect control of flow. Nylon plug valve (above) is easier turning, non-dripping: Ladish Co., Tri-Clover Div., Kenosha, Wis. (106H)

Satisfaction rests on the cartons

Mounting sales of Jesse Jewell's Frozen Fresh Chicken support J. D. Jewell, Inc.'s program of "quality control from egg to package." Equally thorough in its selection of shipping containers, this leading processor consistently specifies Union Corrugated Boxes. Manufactured in the world's largest integrated paper and board mill, Union boxes are always dependable. They protect your product. They guard your reputation.

TRADE MARK
UNION
INTEGRATED PLANNING
INTEGRATED PRODUCTION

UNION BAG & PAPER CORPORATION

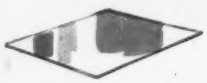
CORRUGATED CONTAINER DIVISION • Box Plants: Savannah, Ga., Trenton, N. J., Chicago, Ill.

Eastern Division Sales Offices: 1400 E. State St., Trenton 9, N. J. • Southern Division Sales Offices: P.O. Box 570, Savannah, Ga.
Western Division Sales Offices: 4545 West Palmer, Chicago 39, Ill. • Executive Offices: Woolworth Bldg., New York 7, N. Y.

For more information, use coupon on last page.

DURADOME

TANK CAR PRODUCTION HIGHLIGHTS



PLANING . . .

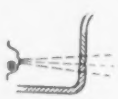
Heavy gauge steel plate is cut to precision width with edges squared and beveled for fitting and welding—all in one automatic planing operation.

ROLLING . . .

Steel plate is then precision roll-formed by heavy duty rolls capable of handling large steel plates up to two inches thick.

FLUING . . .

A specially-built giant press forms the dome base by actually pressing and fluing it out of the heavy center section.



X-RAYING . . .

Automatic butt welds are used throughout. This results in stronger joints, and permits direct x-raying, guaranteeing sound welds.

GREATEST ADVANCE IN TANK CARS IN 15 YEARS

acf built DURADOME

flued dome tank car

Improved 4 ways

1 Flued Dome . . . dome base actually pressed out of heavy steel plate – eliminating fillet welds and dome shelf for more strength and corrosion resistance.

2 Pressure-type Construction . . . uses complete "ring-sections" or cylinders to build up the tank. That means heavier steel all the way around for greater durability.

3 All-welded Insulation Jacket (when required) . . . angles and bolts completely eliminated. Streamlined–more weatherproof –needs less maintenance.

4 Standardized Underframe . . . the same, all-welded underframe for tanks of all standard types and capacities. Provides flexibility; economical maintenance!

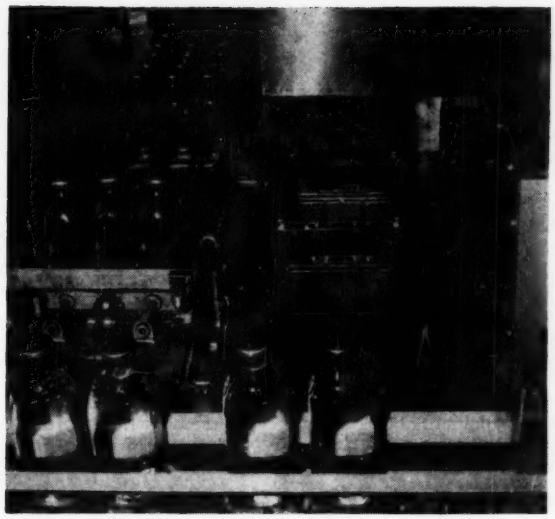
The DURADOME car is available for lease or sale through . . .

SHIPPERS' CAR LINE CORPORATION

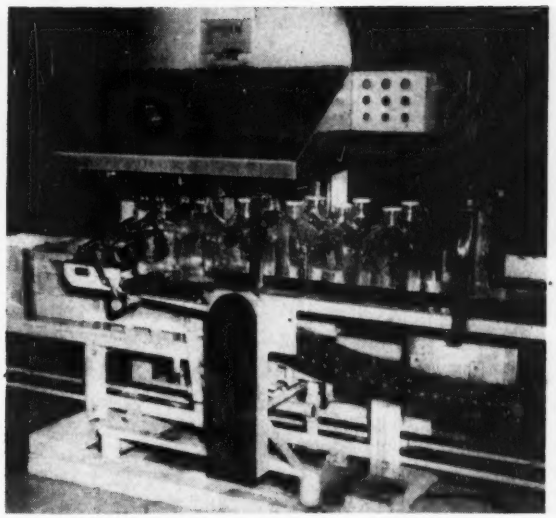
30 Church Street, New York 7, N. Y.

A subsidiary of acf INDUSTRIES Incorporated

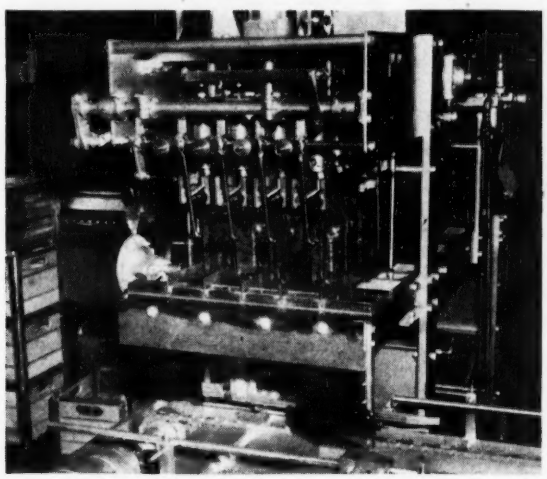
CHICAGO, ILL. • HOUSTON, TEX. • SAN FRANCISCO, CAL. • MILTON, PA. • EAST ST. LOUIS, ILL. • SMACKOVER, ARK. • TULSA, OKLA. • NORTH KANSAS CITY, MO.



C-PAK caser for glass automatically assembles filled bottles lowers them into case. Should empty bottle remain in case unit will not discharge load: Cella Machinery Inc., New York. (109A)

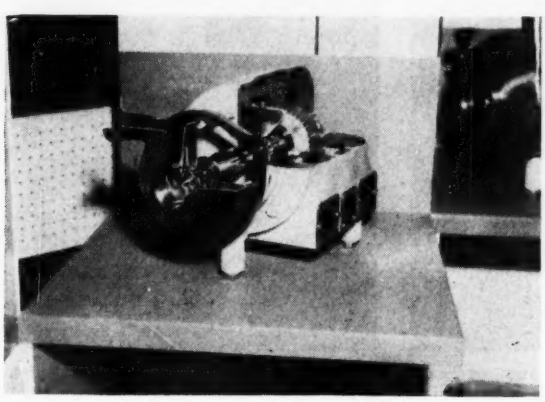


AUTO-CASER transfers bottles from single line to accumulating loader, positions case, then lowers bottles. Handles ½-gal., qt., pt., ½-pt. bottles at high speeds: Walker-Wallace Ltd., Toronto, Canada. (109B)

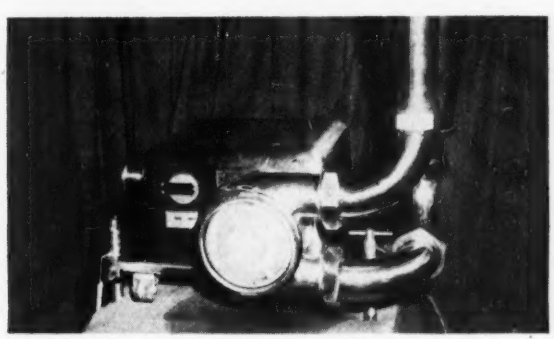


HIGH-SPEED, automatic unit raises positioned case to receive bottles, lowers it on discharge conveyor: Distributor Sealright Co., Inc., Fulton, N. Y. (109C)

STACKER receives filled cases on one conveyor, elevates them to form stack 3-8 cases high, sets stack on floor conveyor: Mojonnier Bros. Co., Chicago (109D)

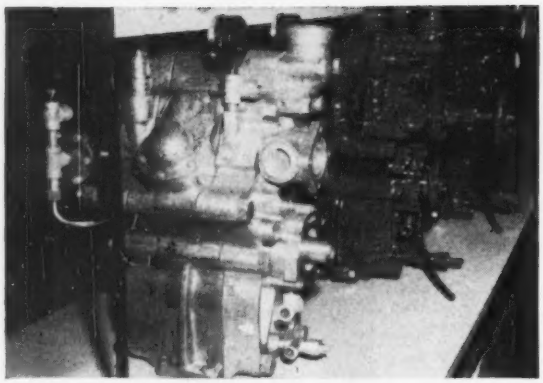


NEW line of sanitary pumps designed for fast, thorough, easy cleaning, CIP use. One-piece stainless impellor enables easy trimming in field: The Creamery Package Mfg. Co., Chicago. (109E)

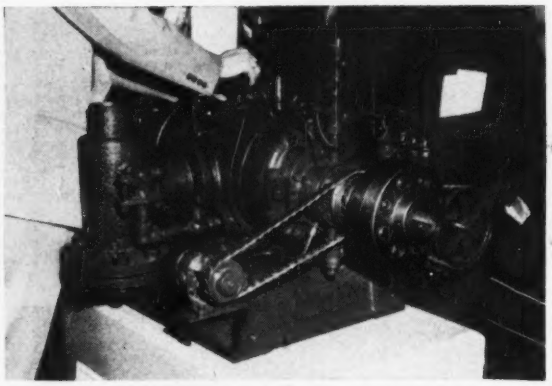


COTTAGE CHEESE pump minimizes breakage of curd through use of special impellors that are visible through transparent plastic cover: Anderson Bros. Co., Rockford, Ill. (109F)

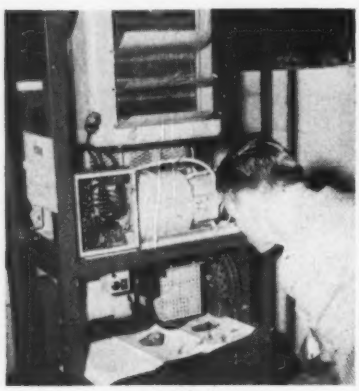
For More Details on These Dairy Units Circle Key Numbers On Readers' Service Card



NEW compressors featuring twin one-piece V cylinders and crankcase blocks with removable end frames and integral manifolds make possible increased capacity by assembling multiple units: The Creamery Package Mfg. Co., Chicago. (110A)

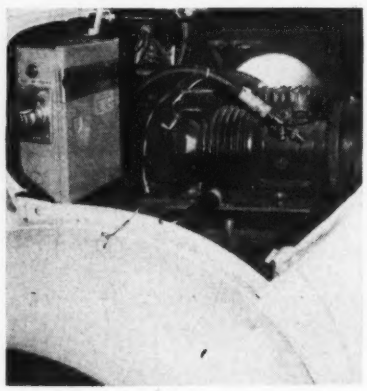


ROTARY BOOSTER compressor for low temperature 2-stage system reduces demand, increases capacity with less connected hp. Features automatic unloader for decreased load: Freezing Equipment Sales, Inc., York, Pa. (110B)

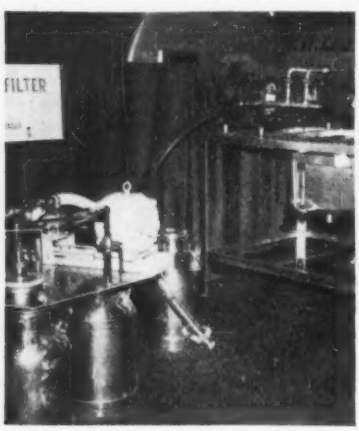


HERMETICALLY sealed refrigeration unit for milk, ice cream trucks. Employs AC generator, driven from engine crankshaft for over-road operation, connects to plant current for stand-by: York Corp., York, Pa. (110C)

KOLD-TRUX unit derives power from truck propellor shaft, live axle or power take-off by automatic clutch. Stop-over refrigeration is by plugging in to plant system: Tranter Mfg. Inc., Lansing, Mich. (110D)



DESIGNED for retail milk trucks, "Retailer" provides plug-in operation for night loading, engine drive enroute. Unit mounts on, is driven by engine: Coldmobile Div., Union Asbestos & Rubber Co., Blue Island, Ill. (110E)



WHOLE CAN cream filters—portable (left), stationary (right)—make quick sediment tests. Plexiglas head gives clear view of nylon filter: L/W Dairy Supply Div., Langsenkamp-Wheeler Brass Wks., Indianapolis. (110F)

RESISTANCE of metal covered cold room door to water penetration is demonstrated by playing stream of water continuously on hinge and door base: Jamison Cold Storage Door Co., Hagerstown, Md. (110G)

TRI-PURPOSE unit for separating, clarifying, standardizing hot or cold milk features enclosed feed that eliminates floor level piping, large capacity bowl, polished stainless finish: Centrico Inc., Englewood, N. J. (110H)

How ENDURO Bonus Benefits Give Better Product Control

You can store 2000 gallons of milk in this stainless steel tank. What's more, the milk can stay there *without harmful bacteria count increasing.*

As a result, this cheese manufacturer has better control of his product quality. He can also arrange his work schedules so that they're uniform, because he knows the milk is safe in ENDURO Stainless Steel until it's processed.

One big reason is ENDURO'S smooth surface that offers little foothold for contaminants. It doesn't contaminate metallically. Nor does it add anything to food products. Or take anything away. And it resists the action of food acids.

Cleaning is simple and easy. All it usually takes is a quick wash and a rinse to restore ENDURO'S satiny luster. It means less down time, more production time, and a product you're proud to label.

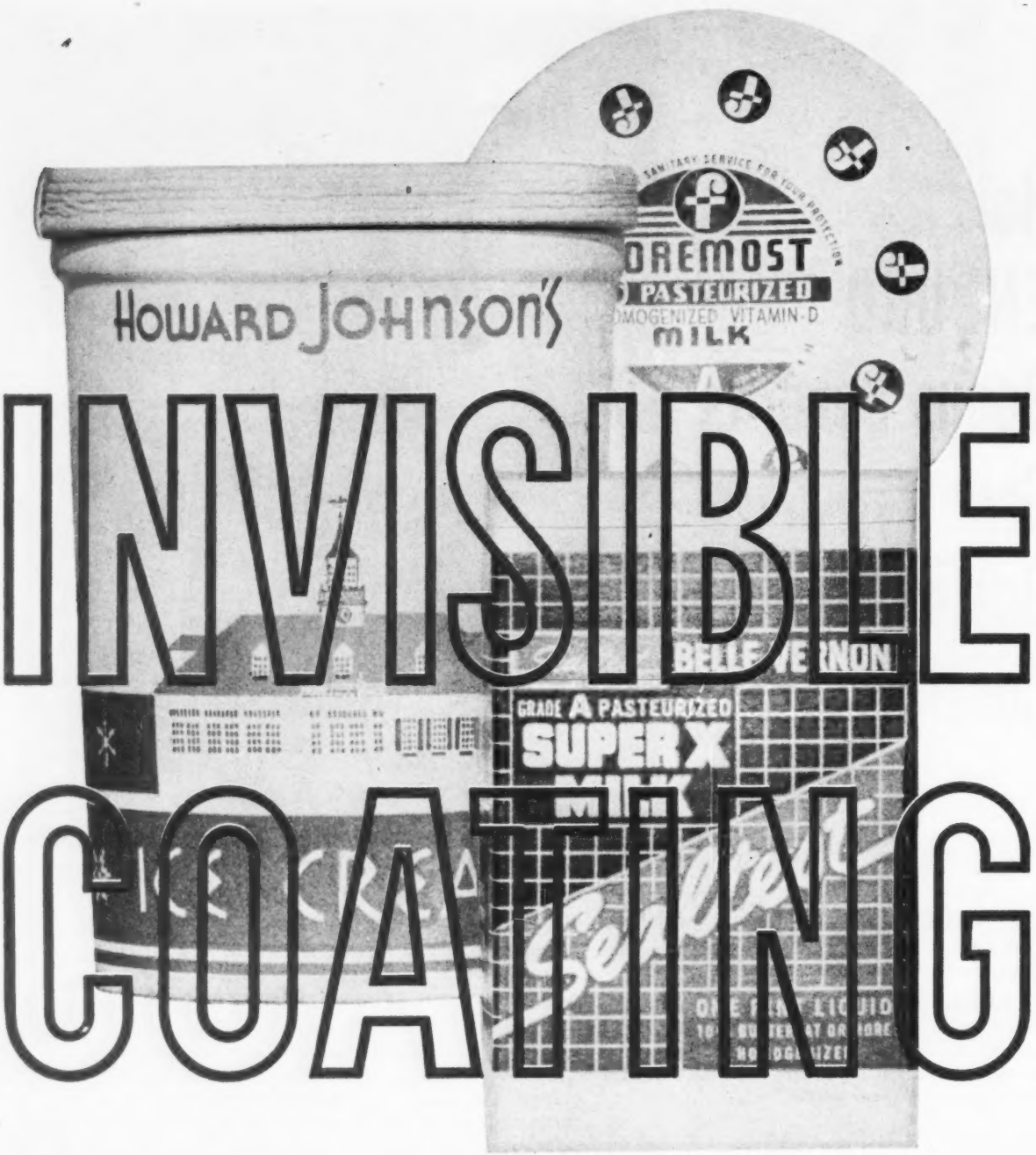
Safeguard the purity and quality of your food products by using equipment made of ENDURO Stainless Steel. Talk it over with your equipment supplier. Republic metallurgists will be glad to help you use this thrifty metal, profitably.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • *Massillon, Ohio*
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

REPUBLIC
ENDURO STAINLESS STEEL

Other Republic Products include Titanium, Tin Plate, Steel and Plastic Pipe, Bolts and Nuts, Tubing, Barrels and Drums, Lockers, Shelving

For more information, use coupon on last page.



INVISIBLE COATING

THAT PROTECTS THE PACKAGE

What keeps these containers and bottle caps strong, clean, and fresh-looking despite constant contact with liquids, ice, food, and grease?

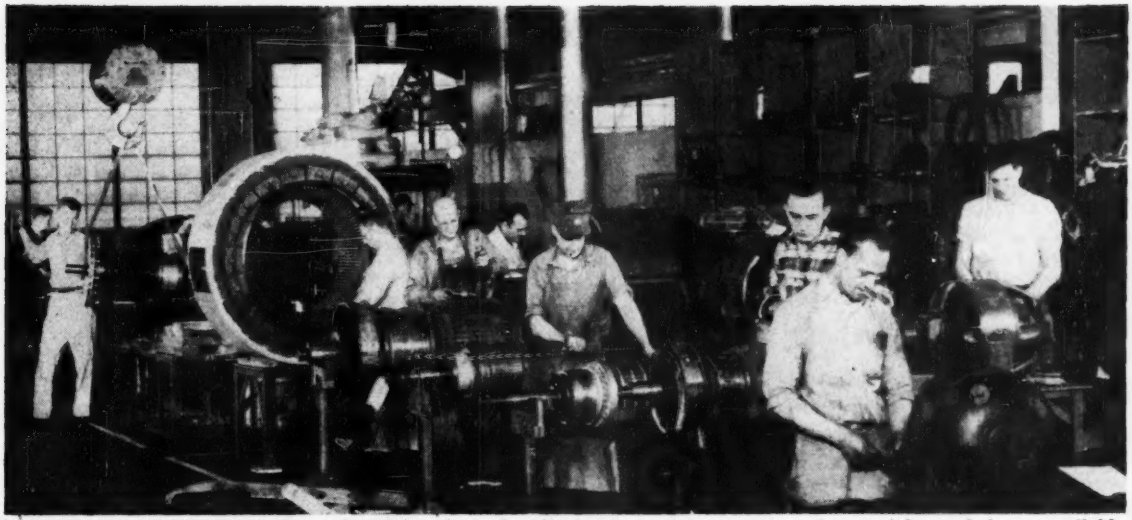
The answer is something you can hardly see—a clear, thin, tough coat of BAKELITE Vinyl Resins, inside and out. Highly inert, it's unaffected by chemicals and moisture. It's odorless and tasteless. Flexible and tight-sticking, it won't flake off. It gives crimped milk bottle covers a fast, strong heat-seal that lasts.

The same coating of BAKELITE Vinyl Resins works on paper, metal, and metal foil—adding protection and heat-sealability, enhancing colors. Make sure your packaging enjoys its competitive advantages. Write Dept. ZV-74.

Data courtesy of **Sealright Co., Inc.,** Fulton, N.Y.

BAKELITE
TRADE-MARK
VINYL RESINS

TRADE MARK
BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N.Y.



OVERHAULS UNDERWAY. They should be planned well ahead so all men, tools and materials needed are available.

Step-by-Step Guide to

PRODUCTIVE MAINTENANCE

System embraces practical techniques for protecting capital investment, cutting product costs, and raising manufacturing efficiencies . . . Care of electrical units illustrates benefits . . .Evaluation of equipment on basis of output and scheduling of critical program round out the 5-point plan

Concluding Part II

AS THE ROLE of mechanization expands by leaps and bounds in the food industry, there is an increasing need for accent upon maintenance.

Further, the specialized approach—demanded for optimum effectiveness of operations—puts major weight upon the type of maintenance that emphasizes productivity.

Five specific steps have been distinguished in a recent systematizing of the technique. Developed by General Electric Co., this plan aims for more production per machine, higher output from a smoother work flow, and increased maintenance-budget effectiveness.

The first three steps—gathering of complete equipment data, determination of the extent of routine maintenance, and establishment of a routine operating control system—were detailed in Part I of this article (Nov. FE, p. 90). Steps 4 and 5, concerned with evaluations for critical maintenance and its scheduling, follow:

Step 4—Evaluate for Critical Maintenance

Up until now, each of our steps to PM have been fairly basic. They covered things that are generally known—and should be more generally practiced. And they are essential to the two steps you now enter.

First, decide what equipment has vital operating importance. Then determine its condition—and its cost of failure.

Now you are ready to establish—and evaluate—"critical parts." Begin by preparing a list of critical equipment. Close cooperation between production and maintenance departments is necessary in this step. Together, these two groups must evaluate the functional importance and duty cycles of all electrical equipment in the program.

Equipment can be considered "vital" if its failure directly or indirectly interrupts or delays production. This condition is appraised by such things as high percentage of utilization, or lack of by-pass equipment. Set up your list of equipment in order of critical importance.

Determine condition of all equipment in the critical list. Ask your equipment supplier to help you make this initial inspection of critical units. Take advantage of his wide experience with his equipment under every type of operating condition.

Consider the age of each critical machine since purchase or latest over-

A Glimpse from the last Hanover Fair

Our fully automatic cartoning and heatsealing-machine PDHJ II a—capacity up to 80 p.m. with multiple conveyor aroused tremendous interest.

FR. HESSER MACHINE BUILDERS A.G.
STUTTGART-BAD CANNSTATT GERMANY

Represented in **USA** by Messrs.
GEVEKE & COMPANY, INC.
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PACKAGING EQUIPMENT Service
Limited—124 Willowdale Street Willowdale, Ontario

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ANAHUAC, S.A.
Mexico 1, D.F., Avenida Madero 6

Represented in **SOUTH AFRICA** **H.J.G. HOLLAENDER & CO.**
P.O. Box 1966 Johannesburg South Africa

Represented in **BRAZIL** **J.G. MALIK** Av. Franklin Roosevelt 137
Rio de Janeiro Brazil

haul. Certain insurance companies consider a machine that has operated 20 years since the purchase or last rewind to be a poor insurance risk. Visual and electrical inspections and tests of machine windings cannot determine the condition of inaccessible windings.

Even a machine kept very clean, with windings periodically varnished, and given good routine maintenance, is still subject to turn-to-turn short circuiting, open circuiting, or grounding of the conductors. Factor-in the duty-cycle, surges, and overloading. All these points contribute to the oxidation of the materials used in the manufacture of the winding and shorten its life.

Based on this inspection, make a list of equipment on which the probability of breakdown is high. You will need this information to set up a planned overhaul schedule, as will be discussed in Step 5.

Failure Analysis

What will a critical equipment failure cost? So far, you know the critical importance of each piece of electrical equipment, and its condition. Now your objective is to find out which special maintenance parts you need to stock as "insurance" to protect highly critical equipment—parts whose use cannot be predicted, such as spare armatures, large coils, complete motors and devices, etc. Here's how:

1. First, decide which parts are most subject to failure. Next, calculate repair time under the following parts-stocked conditions, assuming major failure: (a) no major parts; (b) some; (c) all major, and (d) a complete unit.
2. Determine cost of repair, also inventory cost, for each of the possible conditions.
3. Sum up this information to determine the total "failure cost."
4. Analyze total cost for each condition to determine what you must stock to protect the equipment.

Remember, the answer you arrive at will basically depend on the production operation—and this answer will give you the greatest assurance of continuous production.

A maintenance specialist from your nearest service shop can help you work out this step. He is familiar with the degree of maintenance necessary in your industry, and can help you factor-in operating conditions, duty cycles, and overloads. Fig. 2 depicts an analysis of a production motor (heavy industry, but representative).

In this instance the motor involved was a 500-hp. slow-speed, d.c. unit on a machine critical to production at a large western mill. Problem was to determine how much an armature failure would cost. Down-time was estimated at $700 per hour. Based on this evaluation, it was decided to stock a complete armature for best protection.

Step 5—Establish a Critical Maintenance Program

Minimize down-time costs two ways —by stocking critical renewal parts, and by scheduling overhauls well ahead.

In Step 4, you determined the right degree of protection and the need for overhaul for each piece of critical equipment. Now take the action step —set up your critical maintenance program.

Which parts are most important? Get them first. Then organize your budget so that you can purchase the rest of your critical stock on a planned basis. Remember, too, that your critical equipment demands a more rigid schedule of inspection and service. Maintenance schedules must be more complete, and you must keep closer records of all operations, failures, maintenance and operating costs.

Schedule the "Criticals"

Planned overhauls should be scheduled well ahead, so all the necessary men, tools, and material for the renovation can be made available at the proper time. Overhaul can be set for normal down-time, vacation closings, holiday shutdowns, or for off-season production periods. Least possible disturbance of production should be an objective.

Planned overhaul is effective after equipment has operated over a reasonable service life. It works this way:

On a systematic basis, you should remove the equipment that needs overhaul most (or is most important) from operation for complete rewinding, rebuilding, or modernizing at the most favorable time.

These planned, short-term outages consume far less time than the unplanned shutdowns they eliminate or minimize. As a result, the gap between actual and theoretical maximum production on the part of a machine is narrowed.

Probable retirement or replacement of every piece of critical equipment should be considered in this step. This means that production requirements must be projected into future years. If the anticipated usage of the equipment is only for a short period, it may be good judgment and economics to assume the risk of operating over that period without overhaul, and depend entirely on inspection and routine maintenance.

There will be times where a planned

(Turn to page 205)

EVALUATION OF CRITICAL PARTS PROTECTION REQUIREMENTS

(The Evaluation is based on the failure of a part which requires the longest repair time such as armature coils)

	NO MAJOR PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MACHINE STOCKED
REPAIR TIME	10 days to make coils X	6 days to rewind armature X	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor: $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation: $360
TOTAL FAILURE COST	$180,730	$111,364	$31,350*	$48,460*

X Add disassembly, assembly and transportation time to actual repair time.

*Add repair cost, on straight time basis, of failed unit.

FIG. 2. HERE'S how case histories are kept on critical units. This one covers a motor on a production machine employed in heavy industry.

In Behalf of Progress . . .

Good "Recession Year" Points to Buoyant '55

In this so-called year of business recession now drawing to a close, consumers have bought more goods and services than in any year in history. And despite worrisome unemployment in spots and declining farm prices, the general level of income for the year will be very high—probably even higher than the record level of $253 billion after taxes.

So 1954 has turned out considerably better than many expected, and it winds up at a level that bodes well for the year ahead.

And this encouraging situation is buttressed by industry's plans for capital expenditures and by an upsurge in housing construction.

Recently surveyed by the McGraw-Hill Department of Economics, industry's preliminary plans indicate an expenditure of $20.7 billion on new plants and equipment next year. This is only slightly below the $21.8 billion figure of 1954. Furthermore, a majority of manufacturers now expect to invest as much in 1956 as in 1955, indicating a leveling off of a capital-spending decline that started late in 1953. And about as many companies plan to increase capital spending in 1956 as plan to reduce it.

It is significant that food manufacturers, exclusive of beverage companies, indicate an increase of 10% in expenditures for new plants and equipment next year. Preliminary plans put the figure at $548 million, compared to $499 million for the past year.

The outlook is different, however, for beverage makers. Their capital outlay next year apparently will be down 48% to $138 million, compared to $265 million for 1954. Completion of some major brewery modernization and new plant projects accounts for part of this drop. And the plans of distillers, who were included in the beverage survey, affect the figure.

Looking farther ahead, 56% of food and beverage manufacturers expect their capital expenditures to be about the same in 1956 as in 1955. The remainder are split about evenly between greater and less expenditures.

Sales expectations also were checked in the survey. And as might be anticipated in the steadily growing food business, the outlook is bright. Seventy percent of food and beverage manufacturers look to increased sales next year, 18% put sales at the same level as this year, and only 12% see a drop in volume.

All of this seems to add up to a good volume of business for the food industry next year, with consumer income continuing at a level where convenient, high-quality foods will be in demand.

But this doesn't mean easy sailing for any one food manufacturer. On the contrary, the plans for capital spending point to still tougher competition through more efficient operation. And high volume will be required to compensate for high capital investment and low profit margin.

So as 1954 goes into history with a better than expected record, you can look to 1955 as a year of opportunity for the pace-setters—and for those who keep up with them.

Take Advantage of Tax Law

Have you equipped yourself with an analysis of the new tax law, with its 3,000 changes?

Half a million man-hours went into the preparation of the new law. And spokesmen for industry had a big hand in shaping the changes to fit business requirements. So you will want to take advantage of their good work.

Here are principal areas in which you may benefit:

1. Equipment write-off can be speeded to ease modernization costs. (See article on p. 66.)
2. Research and development costs may now be deducted the year they are incurred.
3. Tax accounting has been brought more nearly into line with accepted accounting principles.
4. Partnerships and proprietorships may, under certain circumstances, elect to report and be taxed as corporations.
5. Retention of earnings for future expansion or modernization is made easier by a $60,000 accumulation-credit.
6. Net losses in one year may be carried back two years to get a refund on previously paid taxes to bolster your financial position at a critical time.

If you have not already done so, it will pay you to have a certified accountant tell you how to take advantage of the new tax law.

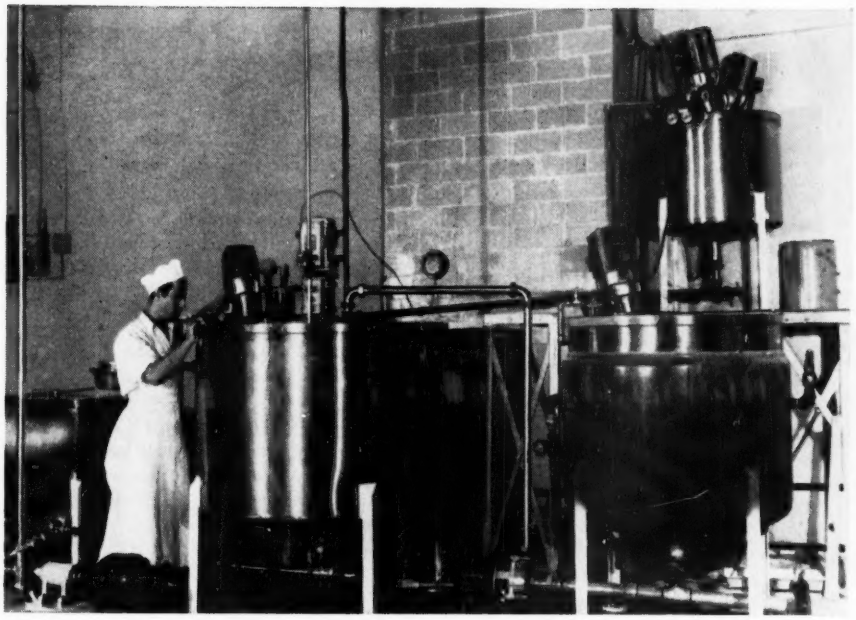
Make a Bid for the Oscar

Food manufacturers are notorious for hiding their lights under a bushel. Part of this comes from a desire for secrecy, part from modesty, and part from lack of a flair for public relations.

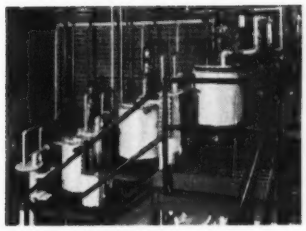
Ability to keep anything a secret is more imaginary than real. Modesty is a fine trait, but not when carried to excess. And poor public relations is bad business.

So don't hide your shining light of technical progress. Take credit for it before someone else hits the headlines with a parallel achievement that steals your thunder. Reap the multiple benefits of credit for a job well done.

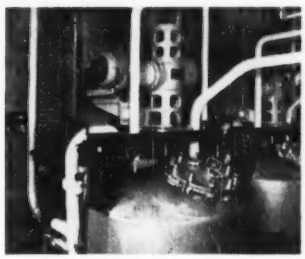
And no better time to start than right now. Enter your company's new process in the Food Engineering Award competition. (See October FE, p. 244.)



ANY TANK OR KETTLE becomes an efficient mixing unit when you add a LIGHTNIN Portable Mixer. No baffling is necessary. The mixer can be removed or switched to another tank at any time. More than 30 models. Sizes ⅛ to 3 HP.



FOR PRESSURE or vacuum mixing, propeller-type LIGHTNIN is easily bolted to tank nozzle. Has integral stuffing box, ready to operate. Sizes ¼ to 3 HP.



FOR LARGER BATCHES turbine and paddle type LIGHTNIN Mixers provide exact balance of flow and turbulence for maximum results. Hundreds of power-speed combinations. Sizes 1 to 500 HP.

5 ways to CUT fluid mixing COSTS

1. You can mix big batches—as big as you want—with a standard LIGHTNIN Mixer. For instance, you can blend as much as 3,000 gallons of syrup, filling, or thin sauce—as much as 500 gallons of heavy batter—with a portable propeller-type LIGHTNIN.

2. You can switch a LIGHTNIN Portable Mixer from tank to tank, as your mixing requirements change. You can get shafts and propellers to fit different batch sizes, saving much of the cost of a complete new mixer.

3. You can handle peak loads, by adding a simple tank or kettle to the line. Clamp a LIGHTNIN Portable in place, and you're ready to start mixing.

4. You can save costly man-hours by refusing to let personnel mix or stir with hand paddles. Even on simple mixing jobs, it's much faster, cheaper (and results are always uniform) when you let a LIGHTNIN do the work.

5. You can be sure about results, because every LIGHTNIN Mixer is *fully guaranteed* to do the mixing job *right.* Many LIGHTNINS have been running smoothly for 20 years and more.

Lightnin® Mixers

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Making Quality Crackers in Volume

Materials-handling, mixing, baking techniques set pace. Sanitation, too

MODERN, highly sanitary, and efficient materials handling and processing equipment highlight the mass production of top-grade crackers and biscuits in National Biscuit Co.'s new bakery in Chicago.

At this plant, major ingredients, both solids and liquids, are received in bulk form. Solids travel from railroad cars to receiver at top of storage bins—Point (1) on accompanying flowsheet—via highly sanitary, self-cleaning pneumatic conveyors.

Liquids arrive in tank trucks and special railroad cars equipped with steam jackets operated under instrument control. Heated to proper temperatures, these items then are moved, by positive displacement pumps, through pipelines to huge horizontal tanks in the tower section of the building.

Movement of solids from bins to scales is via sanitary screw conveyors. These movers have hinged bottoms that permit exposure of all contact surfaces for fast and thorough cleaning operations. Quantities carried are regulated from a central control panel on which desired weights for each particular batch are set. Enroute, flours are passed through all-metal gyratory sifters. Also, liquid ingredients are weighed, as required, for each batch.

Scaled materials then are dropped to portable troughs or upright 7-bbl. mixers, depending upon product variety.

A filled trough, equipped with casters, is rolled into position beneath a spindle mixer and locked in place. Spindles are lowered and ingredients mixed. Upon completion of mixing, spindles are raised and trough is pushed out from beneath mixer, and transported to proof room.

Doughs from the upright mixers are transferred to troughs, and these, too, go to the proof room. Here, temperature and relative humidity are held at 80 deg. F. and 65%, respectively.

From proof room, troughs are delivered to mechanical hoist, and dough is dropped through a floor opening into a stainless steel chute leading to the sheeter (4). Here, dough is rolled into precision-thickness sheets, then passed beneath a cutter for stamping out crackers or cookies. Unstamped portion of dough is automatically and continuously collected and returned via belt conveyor to sheeter.

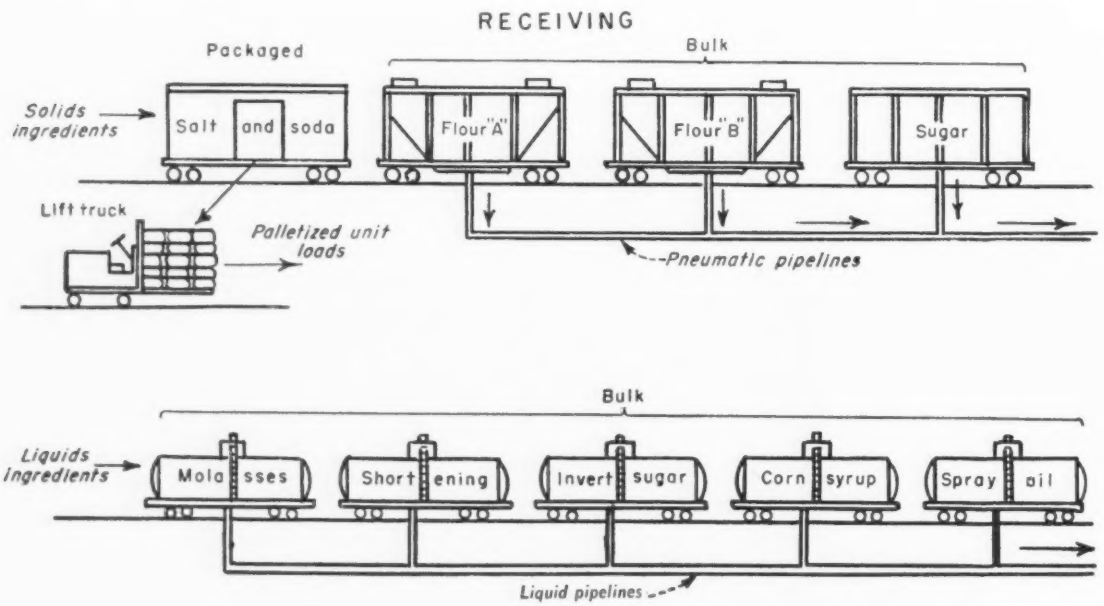
5 Million Per Shift

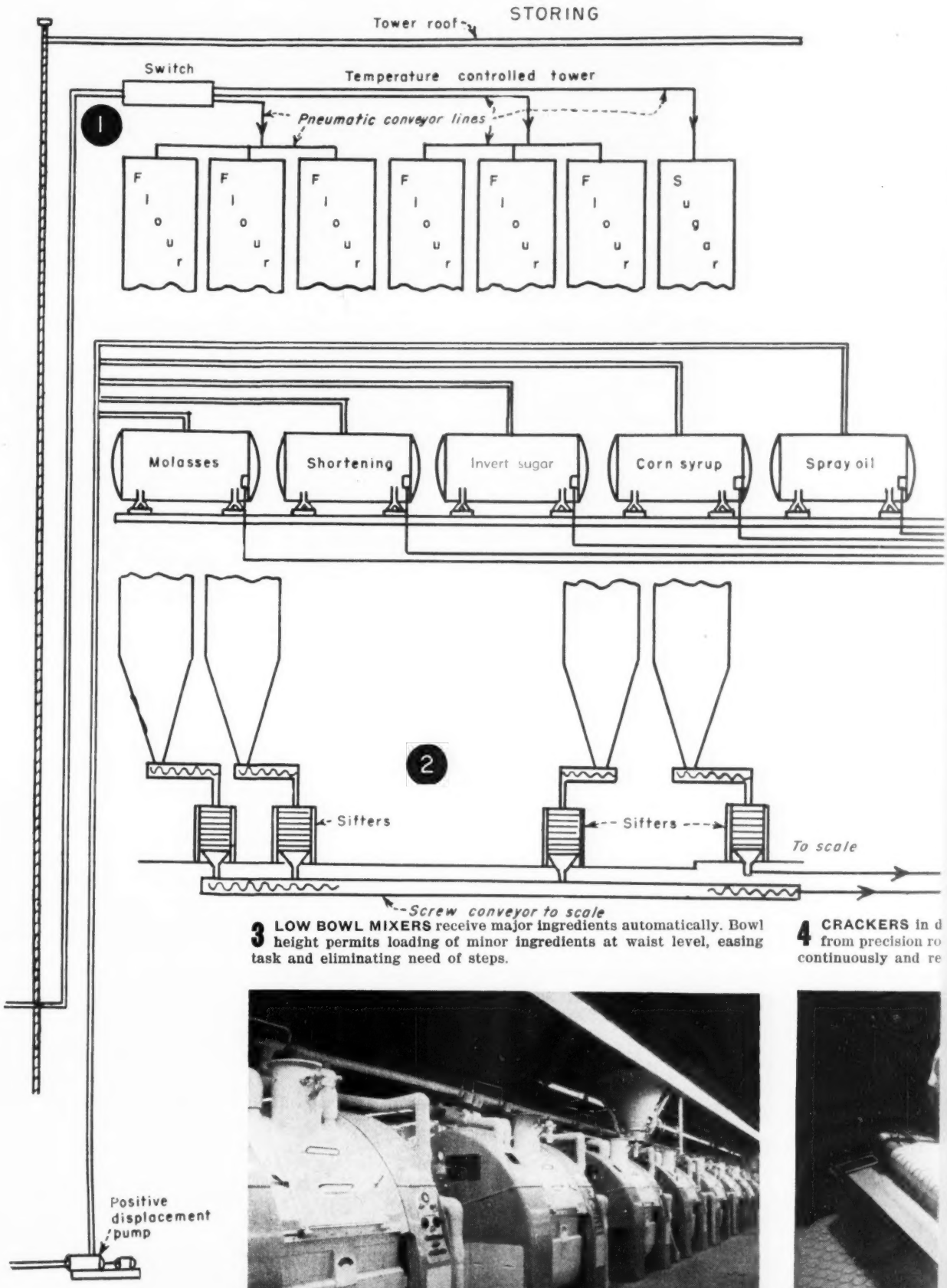
Crackers in dough form are delivered into a streamlined, 300-ft.-long continuous stainless steel band oven. There are 12 ovens in this plant. Each oven has seven zones wherein temperatures are rigidly controlled by automatic instruments. Band speed also is regulated. Thus, baking quality is assured. Capacity per oven is 5,000,000 crackers per 8-hr. shift.

Baked crackers stream from the oven over a transfer unit (where some are sprayed) and continue on a straight line to the 240-ft.-long cooling conveyors. Cooled crackers are delivered to automatic fillers equipped with vibrating feeders and capable of filling to within a weight tolerance of approximately a single cracker.

Filled packages are checkweighed to assure full weight and continue on to a closer, top sealer, and a bundling machine, where four boxes are wrapped into a single bundle. These bundles go via continuous conveyors to the shipping branch, where they are transferred to hand trucks for delivery to enclosed rail and truck shipping docks.

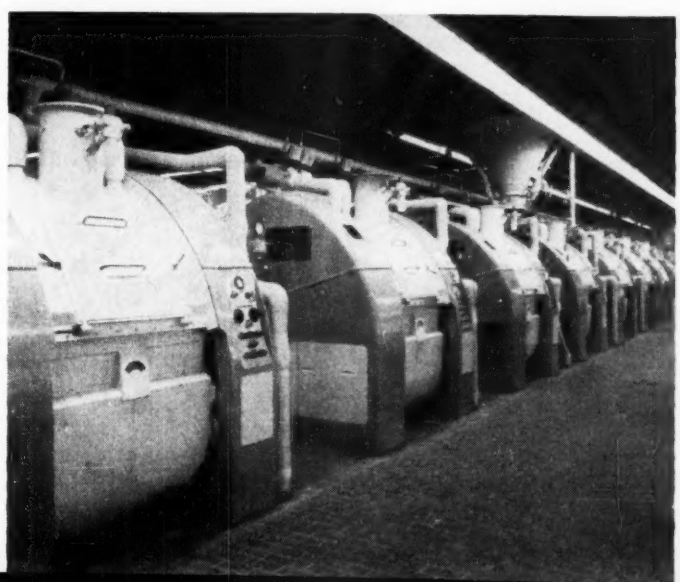
UNFOLD HERE

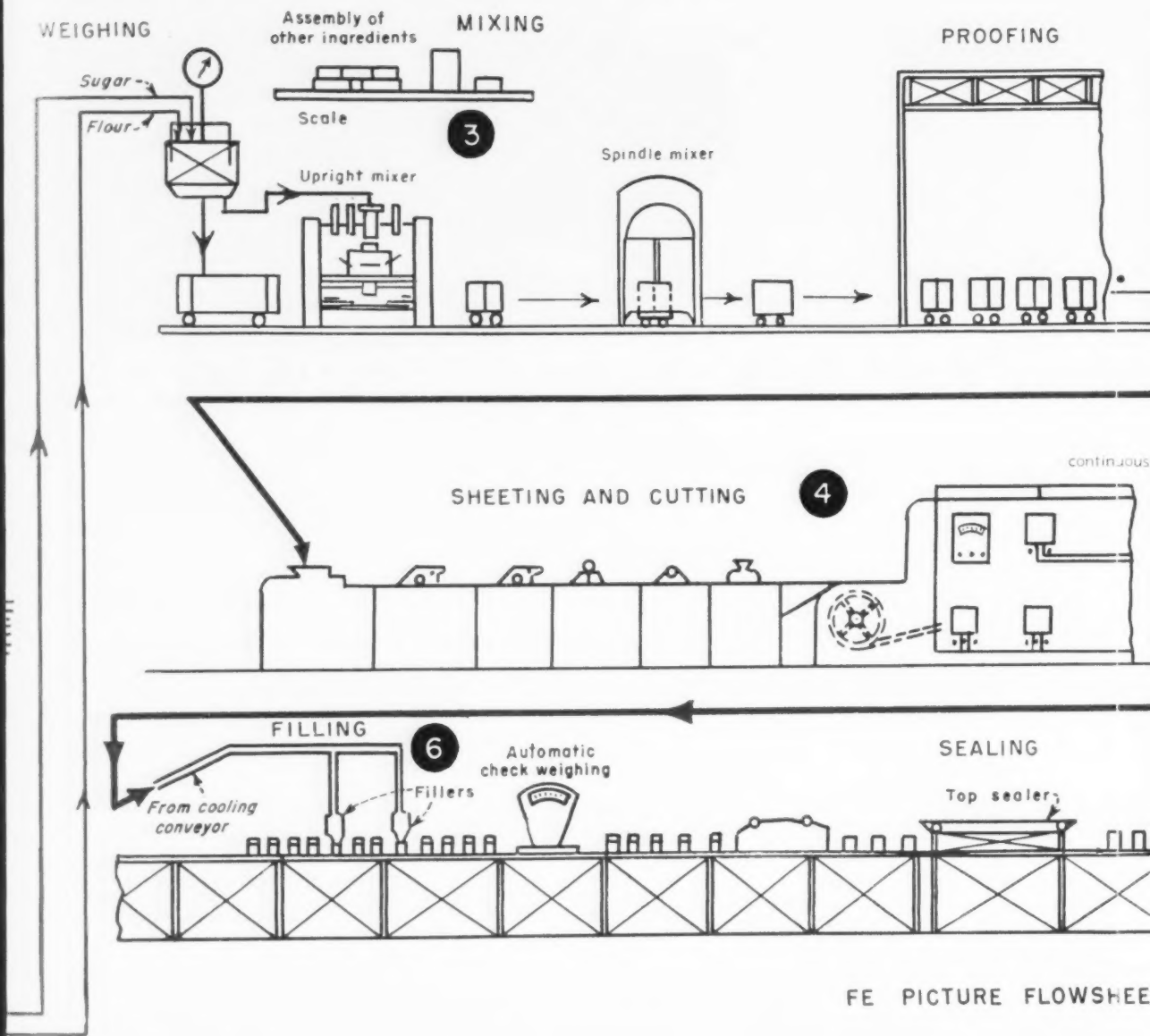




3 **LOW BOWL MIXERS** receive major ingredients automatically. Bowl height permits loading of minor ingredients at waist level, easing task and eliminating need of steps.

4 **CRACKERS** in d from precision ro continuously and re



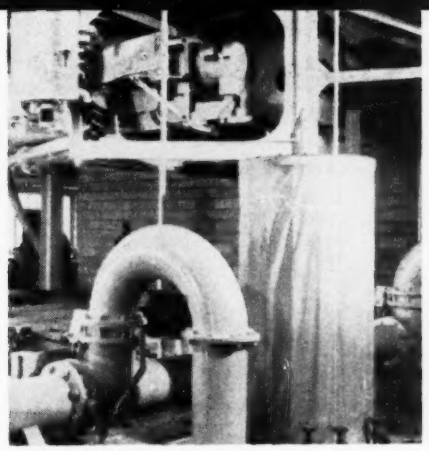


FE PICTURE FLOWSHEE

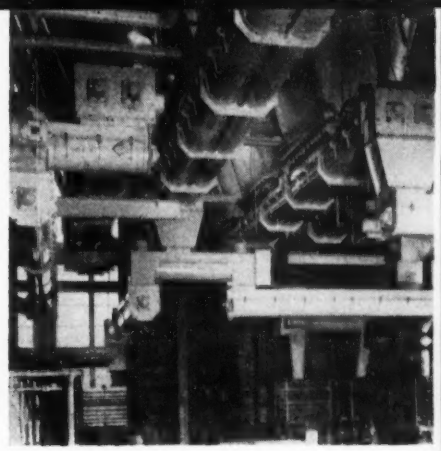
ough form are automatically stamped out lled sheets. Unstamped dough is recovered turned via belt to sheeter.

5 **FILLING** and check weighing of cartons are automatic. Vibrating feeders are accurate to weight tolerance of approximately a single cracker.

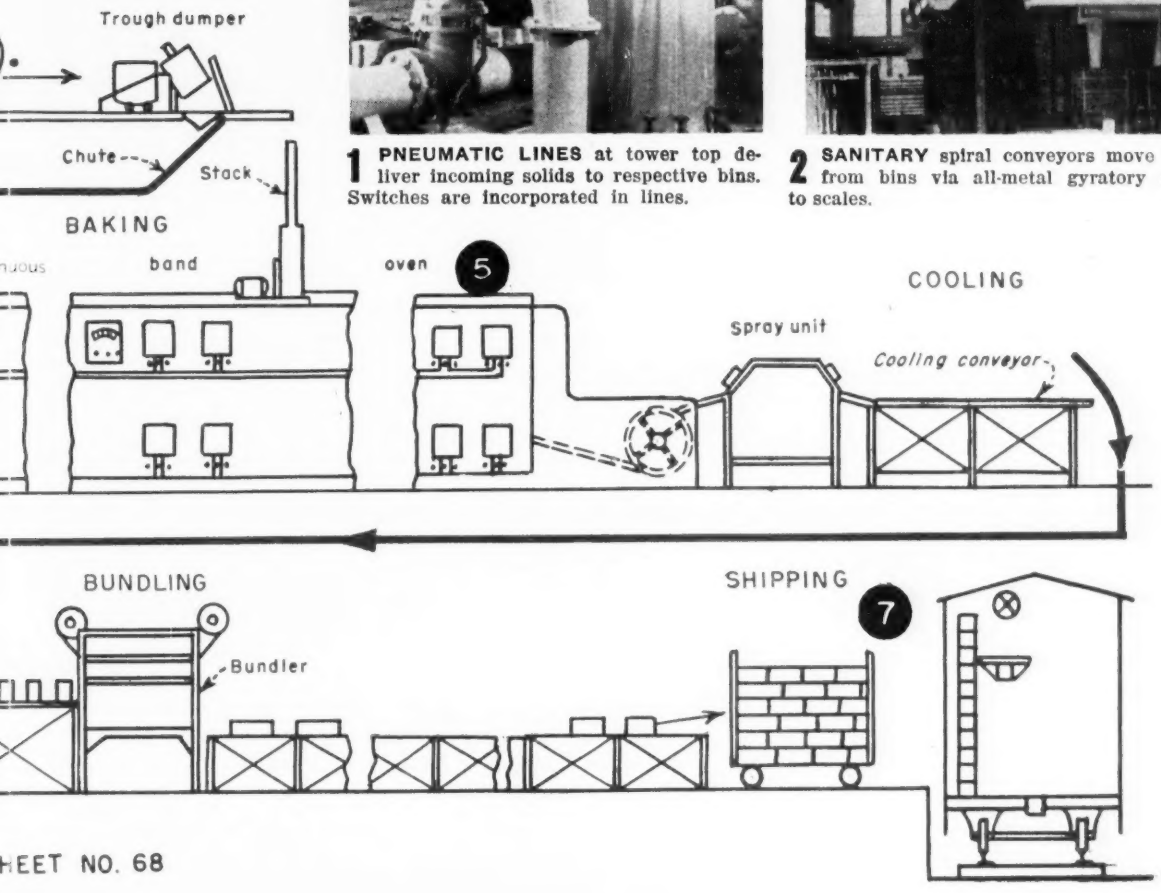
6 **THIS BAT heart of pl zones. Band sp**



1 PNEUMATIC LINES at tower top deliver incoming solids to respective bins. Switches are incorporated in lines.



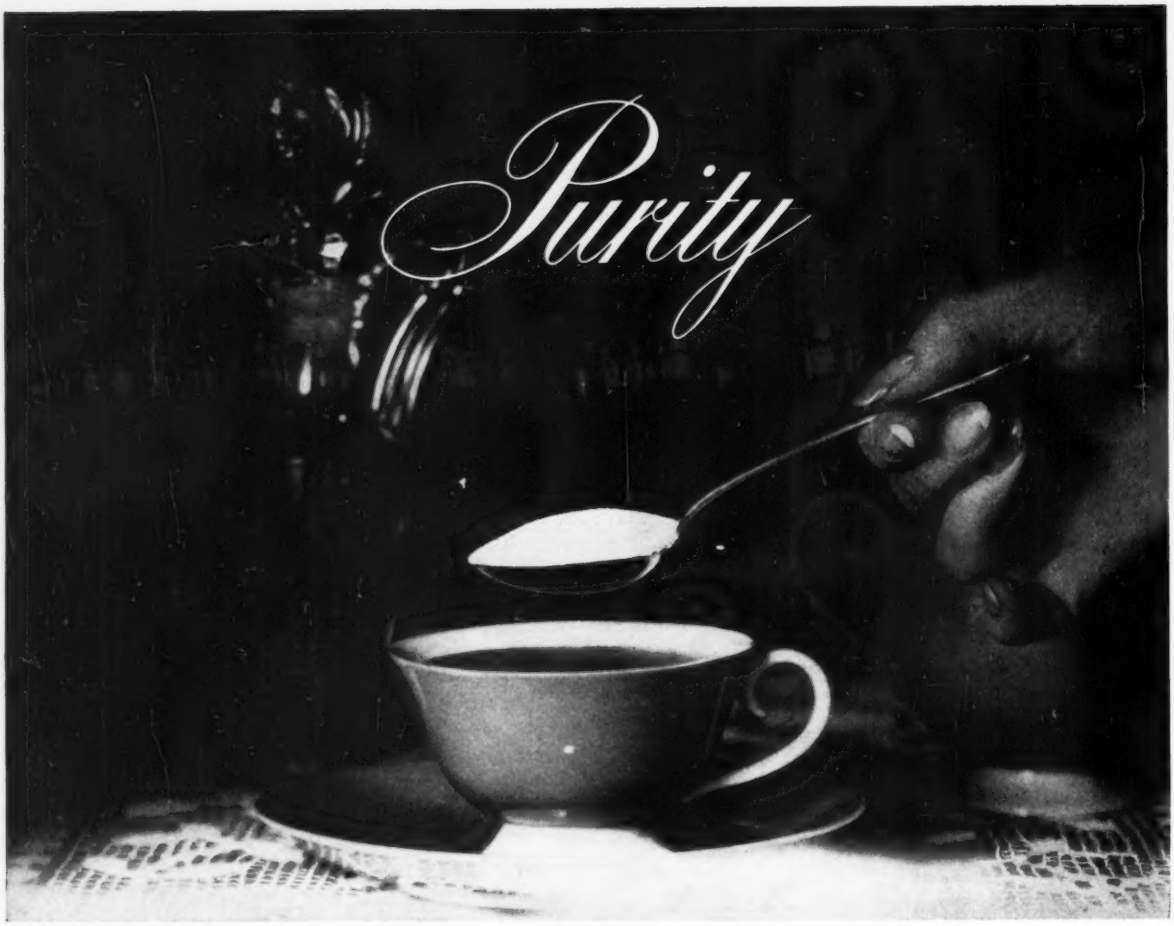
2 SANITARY spiral conveyors move solids from bins via all-metal gyratory sifters to scales.



HEET NO. 68

BATTERY of 12 streamlined, continuous, stainless steel band ovens comprise of plant. Each oven is 300 ft. long, has 7 instrument-controlled temperature nd speed is regulated, too.

7 THESE HAND-TRUCKS, loaded from conveyor lines from packaging, are moved by electric tractors to enclosed shipping docks.



THANKS TO AN INGREDIENT THAT ISN'T THERE AT ALL!

Strange but true...something you can't find in the final product is helping to maintain the purity of many food products and providing an extra safeguard to the meal tables of the nation.

That "something" is Dicalite. For Dicalite diatomaceous filteraids give filtration so "sharp" as to remove unwanted solids even down in the submicron size range. Sugar refiners count on Dicalite filtration to remove thermophilic bacteria and meet the high purity standards of canners. Processors refining and hydrogenating vegetable oils use Dicalite to remove decolorizing agents and every trace of the necessary nickel catalyst. Producers of beer, wine, vinegar, salad dressings, fruit juices, pectin and preserves are among the other food processors who have found Dicalite filteraids of definite aid in maintaining the quality of their products and in speeding up production.

If you have not fully investigated the advantages of Dicalite in your processing, write us for a copy of our Bulletin B-12, which gives full details on Dicalite filteraids together with practical application and operation data.

Dependable GLC GREAT LAKES **Dicalite**® DIATOMACEOUS MATERIALS

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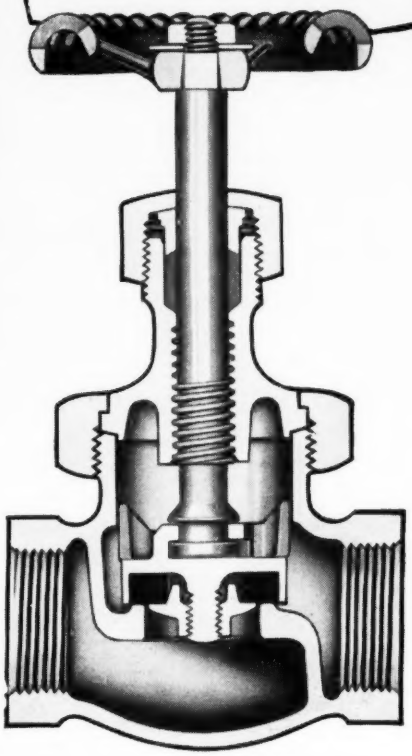
A New Disc . . .
A "New" Valve



Crane No. 7 Brass Valves with quick-change composition disc

Save time, trouble, and money by standardizing on these Crane quality 150-Pound Valves. Simple to service. No big inventory of replacement parts. Just a few extra disc holders . . . a supply of composition discs. That's all you need for a wide variety of fluids . . . and an economical maintenance program.

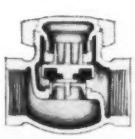
The composition disc takes most of the normal wear—stands up well under ordinary usage—seats easily even on air and gas—absorbs foreign particles that might cause leakage in metal disc valves. When a leak shows up, make a "new" valve—with a new disc. Simply dismantle the union ring, lift out the trimmings, replace the disc holder assembly. Takes only a few minutes. Save the disc holder you removed—use it with the next replacement disc.

Rugged construction throughout. Sturdy bonnet joint, well reinforced by heavy union ring—can be repeatedly dismantled and reassembled. Get better acquainted with the Crane No. 7 line . . . for steam, hot and cold water, air, oil, gas, gasoline, and many other fluids.

No. 7 Globe
Sizes ⅛ to 3-inch

No. 7 Angle
Sizes ⅛ to 3-inch

Specify No. 9 for Flanged Ends



No. 27 Check
Sizes ¼ to 3-inch

GLOBES, ANGLES, AND CHECKS

Ask for folder AD-1682R—contains full facts on the No. 7 brass valve line and the companion No. 27 check. Your Crane Representative has a copy for you—or write direct to address below.

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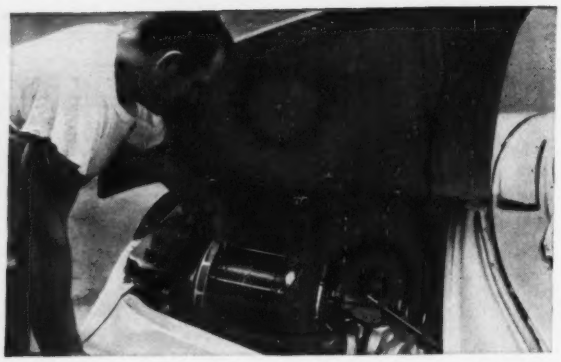
For more information, use coupon on last page.

BIGGER PAY LOAD can be carried a greater distance from plant by this refrigerated truck of Belle Vernon Milk Co., Cleveland. Refrigeration equipment is served by G-E "packaged" electrical system.



IN-TRANSIT POWER produced by this General Electric belt-driven alternator is rectified to drive G-E d-c compressor and evaporator motors in the truck body.

115-VOLT AC PLUG-IN provides power for full cooling during loading and over-night storage, completing "24-hour performance" of G-E electrical system.

New G-E electrical system for truck refrigeration helps

Cut local delivery costs . . . extend runs

Now you can eliminate the expense, inconvenience, and inefficiency of ice cooling on local-delivery milk, food, and beverage trucks. Simply order your new trucks equipped with 24-hour refrigeration utilizing General Electric's compact new electrical system.

LOW-COST IN-TRANSIT AND STANDBY COOLING. On delivery runs this G-E electrical system—powered by an engine driven alternator—delivers 100% capacity even when the engine is idling. During loading—and for overnight holding—all you do is plug into any handy 115-volt AC outlet.

PAYS FOR ITSELF OUT OF SAVINGS. By replacing hard-to-handle ice with this compact equipment, you can increase your pay load, minimize costly truck-body rust. You can schedule loadings more efficiently, make longer truck runs without risk of en-route spoilage. And you'll enhance the demand for your products by delivering them cool and fresh.

BEFORE YOU ORDER local-delivery trucks, be sure to discuss this versatile new G-E electrical system with your truck-body builder or truck refrigeration equipment supplier. These concerns are invited to obtain full information by contacting their nearest G-E Apparatus Sales Office.

WRITE FOR BULLETIN GEA-6084 to Sect. 704-40, General Electric Co., Schenectady 5, N. Y.

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GENERAL ELECTRIC

Capital Spending Plans for 1955 . . .

Here is Good News About Business Prospects

In 1955, American industry is now planning to spend within 5 per cent of the amount it is spending this year on new plant and equipment. This is the tensely awaited result of a check-up just completed by the McGraw-Hill Department of Economics.

Hundreds of companies, by far the largest number in the eight-year history of these McGraw-Hill surveys, cooperated in the check-up. Combined, they represent 29 per cent of all industrial employment and over 60 per cent of employment in the industries where capital investment is highest. Such a broad cross section constitutes a reliable gauge of the plans of industry as a whole.

PLANS FOR CAPITAL INVESTMENT

	MILLIONS OF DOLLARS			Percent Change
	1953 ACTUAL*	1954 ESTIMATED*	1955 PLANNED	1954-1955
All Manufacturing	$10,026	$ 9,249	$ 8,598	—7%
Petroleum Industry†	4,600	4,875	4,920	+1
Mining	506	380	311	—18
Railroads	1,312	851	769	—10
Other Transportation and Communications	2,954	2,922	2,640	—10
Electric and Gas Utilities	4,548	4,274	4,206	—2
ALL INDUSTRY	23,271	21,784	20,727	—5

*United States Department of Commerce; Chase National Bank; McGraw-Hill Department of Economics

†Petroleum refining, included under both "All Manufacturing" and "Petroleum Industry," is included only once in the total

What is the meaning of these plans, detailed by the table below, for capital investment next year? Is it good or bad news, so far as it concerns the prospect of continuing prosperity? It is to this crucial question that this editorial is addressed.

Key to Prosperity

It is not only good but very important business news that American industry plans to spend in 1955 almost as much for new plant and equipment as it is spending this year. The reason it is important is that a high level of activity in the capital goods industries is universally recognized as a particularly potent ingredient of prosperity for the nation as a whole. A dollar spent for capital goods is spent again and again for wages and materials. Its stimulating effects, called by economists multiplying effects, move through the economy in much the same way that a pebble tossed into a pond creates a widening circle of ripples. This is one reason why there is such intense business interest in the surveys of plans for capital investment.

Here are the principal reasons why the results of the McGraw-Hill survey are a good omen for continuing prosperity:

1. American industry is demonstrating that it does not need the stimulus of war-created shortages, or a rearmament boom, in order to maintain a very high level of capital investment.

The slight decrease now planned for 1955 will still maintain a level only about 11 percent below the all-time peak attained in 1953 under the stimulus of a defense expansion boom.

2. Capital investment promises not merely to stabilize at a high level, but actually to increase as 1955 goes on and thus give renewed stimulus to business.

The level of investment now planned for 1955 by *industry* — manufacturing, petroleum, mining, transportation, communications and utilities — is within 5 per cent of 1954. Contract awards for *commercial* construction — stores, office buildings, warehouses and other service establishments — as compiled by the McGraw-Hill publication ENGINEERING NEWS-RECORD, indicate a substantial increase in 1955. Thus total capital expenditures by *all business* may be very close to this year's total.

Actually, in the fourth quarter of 1954, business capital expenditures, as reported to the U. S. Department of Commerce, are down about 2.5 per cent from the average for the year as a whole. So there is a good chance that during 1955 the annual rate of capital investment will rise above this present level.

Effect of Tax Changes

The plans reported by the McGraw-Hill survey are preliminary plans, reported at the beginning of the period of business budgeting for 1955. As budgets are completed, new projects may bring the total expenditure that is planned even closer to this year's figure and thus make an even greater contribution to continuing prosperity.

But it also cannot be too strongly emphasized that these are plans; they are not accomplished investments. As such they have the vulnerability to changed conditions that characterize any plans.

There is some indication in the results of the McGraw-Hill check-up that one change in conditions recently made by the United States government has had an important stimulating effect on plans for business investment next year. It is a liberalization of the allowances for depreciation. Apparently encouraged by this provision, most of the smaller companies are planning to maintain or increase their purchases of new equipment next year, whereas during the past three years their expenditures have been declining. This is obviously a development that strengthens our economy.

A government insensitive to the key importance of capital investment by business, both in providing prosperity and in raising our standard of living, might easily destroy the present plans. One of the easiest and surest means to do this is excessive taxation of business profits which are the key ingredient of business investment. Whether the extraordinarily constructive program recently enacted by the federal government in the field of business taxation can be sustained remains to be seen. **If it can be sustained, the remarkably cheering plans of business for capital investment in 1955 can readily become firm foundations for a continuing prosperity.**

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

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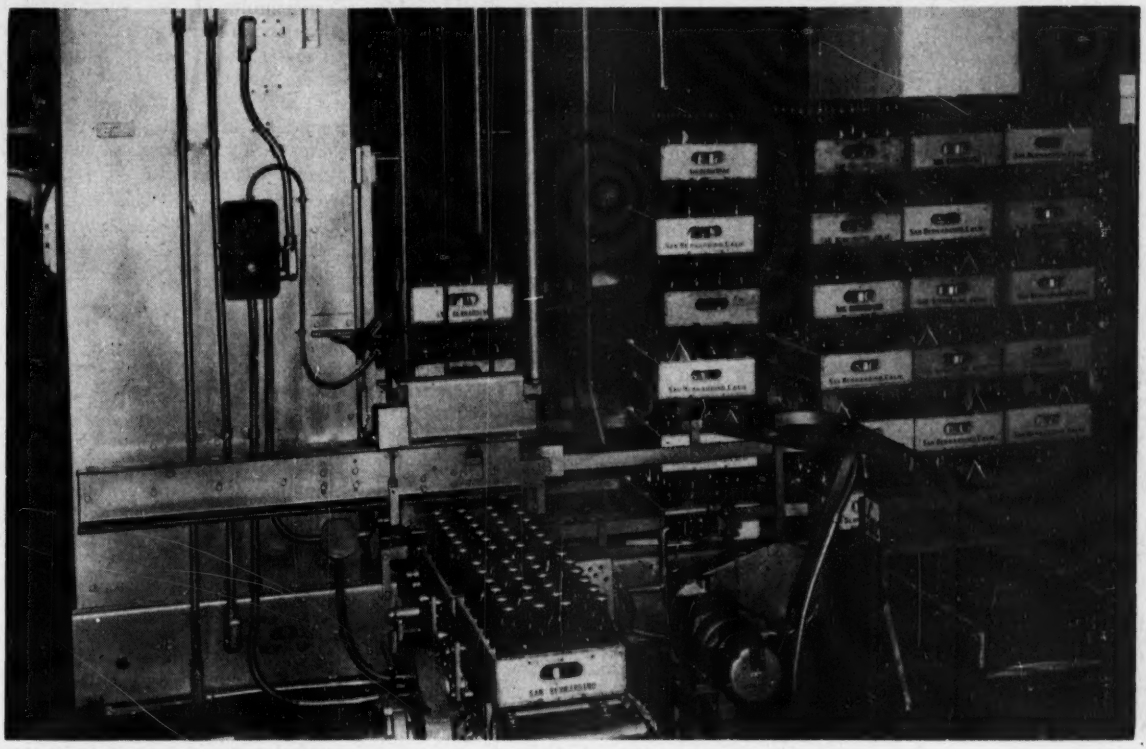
NEW EQUIPMENT & SUPPLIES



Automatic Unit Stacks and/or Unstacks Cases

The daily back-breaking tasks of stacking cases onto pallets, and unstacking empties in beverage plants are eliminated with this new machine. Its use reduces labor turnover and case damage. The unit can palletize and/or depalletize up to 1,000 cases per hr. Here's how it works:

After filled bottles are cased, they move by conveyor to pallet loader and are stacked to predetermined height of 4, 5, 6, or 7, then ejected as a stack to accumulator. When three stacks have accumulated, side by side, a hydraulic slider arm gently slides them onto pallet. Arm returns and waits until three more stacks have accumulated. Then it slides remaining stacks, three at a time, onto half-filled pallet. Now, pallet, loaded with six stacks, is moved by roller conveyor to be picked up by a fork lift and transported to storage areas. Empty pallets which have been placed in position by fork lift operator are automatically fed into machine.

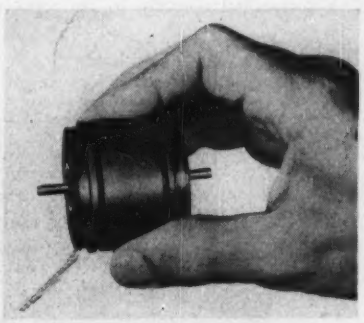
Versatility of machine is exemplified by fact that cases of empty bottles delivered on pallets to unit can be unloaded and unstacked simply by turning switch to "Unload". Cases of empty bottles are moved from pallet onto accumulator, three stacks at a time, by hydraulically operated slider arm. Stacks then move, one at a time, into machine and cases are unstacked from any height, one to seven high, and conveyed to bottle washer.

If a bottling plant has an operation which requires loading and unloading in same area at same time, machine unloads empties, then loads full bottles, using one pallet for both operations. This sequence will continue as long as pallet loads of empties are fed to machine.

Stop bars automatically control entry of cases into machine and regulate loaded pallet movement away from machine towards a lift truck. Push-button, turn-switch operation is order of day with no attendant required once machine begins loading or unloading. If a badly broken case jams flow of entry or discharge, machine automatically shuts itself off. If an empty pallet is not in loading area, machine will fill accumulator with three stacks and automatically shut off. Desired number of cases may be stacked, either 4, 5, 6 or 5, 6, 7 high by turning a control knob, at any time, to the number to be stacked.

If machine is to unload and load automatically, alternately, a knob is simply turned to "Auto". This automatic operation pays for itself in a very short period of time by freeing two men from a back-breaking chore. Machines that load pallets only, or unload only, are available in addition to the dual unit.—*Food Machinery and Chemical Corp., Riverside, Calif.*

Circle 125A on Reader Service Card



New Instrument Motor Has Many Applications

This new two-phase instrument Servo-Motor features a novel construction with an integrally molded stator and housing. New construction method makes it adaptable to many industrial applications for which it had

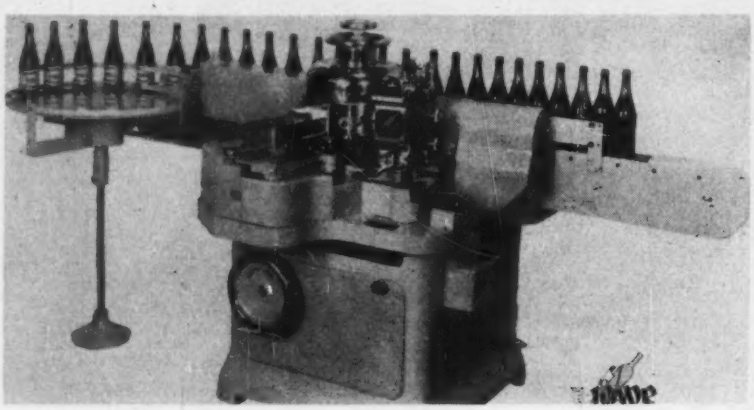
not been previously economically justifiable. Design characteristics are built-in so that long life can be expected even under severe ambient temperature conditions.

Motor is presently offered in ratings of 1 and 5w. Engineering data for the former are; Output, 1w.; frequency, 60 cycles; poles, 2; reference phase, 115v.; control phase impedance, 555 ohms; locked torque 1.5 oz-in.; theoretical acceleration 9,650 rad./sec./sec.

For the latter, data are: Output 5w.; frequency, 60 cycles; poles, 2; reference phase, 115v.; control phase, 115v.; control phase impedance, 575 ohms; locked torque, 5.5 oz.-in.; theoretical acceleration, 19,000 rad./sec./sec.

If desired, motor may be wound, at some additional cost, with high impedance control windings for operation directly from plates of electron tubes. Of particular interest is fact that 1w. motor may be controlled with a maximum of 3w. since most of power required is applied to reference phase. This results in further economies since motor can be operated with a low cost drive package. While intended primarily for commercial use, these motors meet pertinent JAN Specifications for resistances to humidity, salt spray, fungus, shock and vibration.—*Diehl Mfg. Co., Somerville, N. J.*

Circle 125B on Reader Service Card



Labels Round Bottles at 165 Per Min. Rate

Round bottles at the rate of 165 per min. can be labelled with use of this new machine. Further, changeover from one bottle type or label to another can be made in a few seconds.

Called the Jowe, RO-51, it is made in Germany and features the suction principle of label handling. Unskilled labor can operate the machine. Unit is connected directly to conveyor of filling machines and receives bottle in an upright position. First, bottles pass feed screw, which is located on left side of conveyor, from there they are moved equally spaced past label release.

Labels are removed from hopper by suction of cylinder, which peels off one label at a time. Holders pull label out of hopper and hold it until labelling is completed. Machine works on "no bottle—no label" principle.

Vertical glue container, on which flow of adhesive can be regulated accurately, is used on this machine in its approved construction. When machine is running empty, glue container is kept away from labelling cylinder by a switch, so that no glueing results. Unit works as follows:

As bottle passes through automatic intake device a touch system feeler is moved from its place. This closes an air valve and labelling cylinder takes a label from hopper by means of a suction. Holders now lead label past vertical glue container, that also depends for its operation on feeler mechanism and only releases adhesive if a label has been picked up from the hopper. Label is gummed on a horizontal line, stripe like and very thin. As bottle reaches labelling cylinder, which has a rubber padding, label is securely pressed to bottle. Distance of labels from bottom of bottles is guaranteed. Glue and label hopper can be refilled while machine is in operation. Glue consumption is low.—*New Jersey Machine Corp., Hoboken, N. J.*

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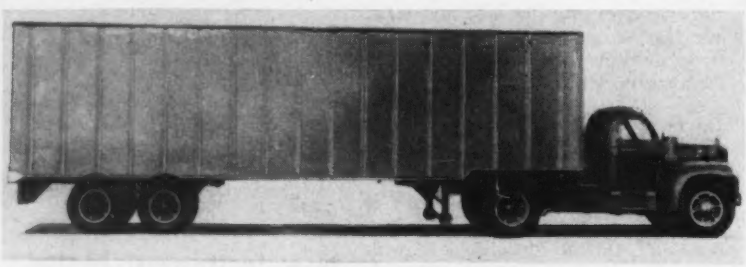


Contour Cab Tractors Permit Maximum Payloads

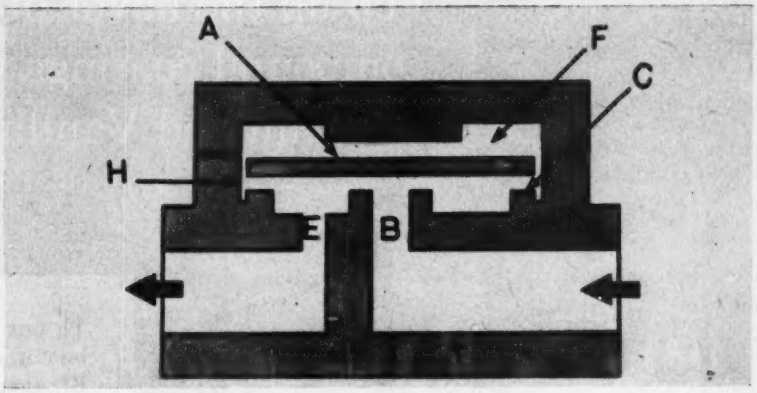
These new contour cab tractors are designed specifically to haul the latest 35 ft. high-volume, square-front trailers in the 55,000 to 65,000 lb. GCW range within 45 ft. overall length.

With new units, called Maxsimums, payload volume is increased up to 30%, according to manufacturers of trailers. Units are basically the B-60LT and B-61LT tractors with a redesigned contour cab. Changes have been accomplished without sacrifice of engine accessibility or driver comfort. Chassis remain lightest in their class and same rugged, standard-design frame with full cross-members and undistorted side rails is used.

Because of spaciousness of cab, it has been possible to create a rear contour which allows for trailer corner clearance. These clearances—even with kingpin set as far as 18½ in. ahead of rear axle—exceed minimums recommended by trailer manufacturers and American Trucking Associations.

Tractors retain all accessibility of their standard counterparts which has made maintenance quick and economical. There is no tilt to engine. All cylinders are directly below hood, forward of firewall. As a result, cab floor is flat.—*Mack Trucks, Inc., 350 Fifth Ave., New York City.*

Circle 126B on Reader Service Card



Design Simplicity Highlights New Compact Steam Trap

Here's a new and very different steam trap—kinetic energy of steam closes the valve. Trouble-free operation is based on new operating principle that permits an extremely simple design—free of usual valve mechanisms, devices, fragile parts.

Only moving part is unique valve head—a solid heat-treated stainless steel disk—that insures practically no maintenance according to manufacturer.

Called the Thermodynamic trap, its operating characteristics are as follows: Closes tight on no load, and operates against a back pressure up to 50% of its inlet pressure. Discharges condensate at saturated steam temperature as rapidly as it forms. This trap can vent large volumes of both air and air-steam mixtures. Starting load capacity is very high, but it operates equally well with light loads or no load. Trap is designed to work just as efficiently at 1 psi. as at 600 psi; it is not affected by pressure variations.

Design and metals used enable this new steam trap to withstand superheat, water-hammer, vibration and corrosive condensate.

Trap is extremely compact: The 1 in. size is only 3½ x 4¾ x 4 in. high. Bodies are of cast semi-steel, carbon or moly steel with screwed, socket weld or flanged connections. Here's how it works:

Disk "A" (see above) forms a valve which seats on inlet tube "B" and also on outer rim "C". It is free to rise and fall in chamber "F". When seated, the disk "A" closes steam inlet "B", and also seals chamber "F".

Pressure on inlet tube "B" raises disk allowing air and/or condensate to flow radially across underside of disk "A" to outlet tube "E".

When steam follows, velocity across disk is much greater and, as steam strikes body at "H", pressure is built up in chamber "F". Pressure on large area of disk "A", causes it to seat, closing inlet tube "B" and sealing steam in chamber "F". As pressure in "F" decreases by condensation, pressure on inlet tube "B" again raises disk "A" and cycle is repeated.—*Sarco Co., Inc., Empire State Bldg., N. Y. C.*

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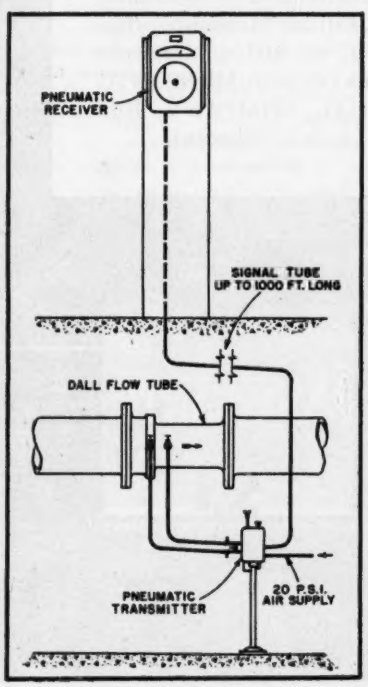


Accurately Meters Flow Of Gases, Liquids

Water, air, gases and other liquids, free of settling solids, can be accurately metered with use of a new flow tube.

Named the Dall Flow Tube, it is accurate primary device having a minimum permanent head loss. Its very short length and comparatively light weight ease handling and installation. Its discharge coefficient is stable and constant over a wide flow range.

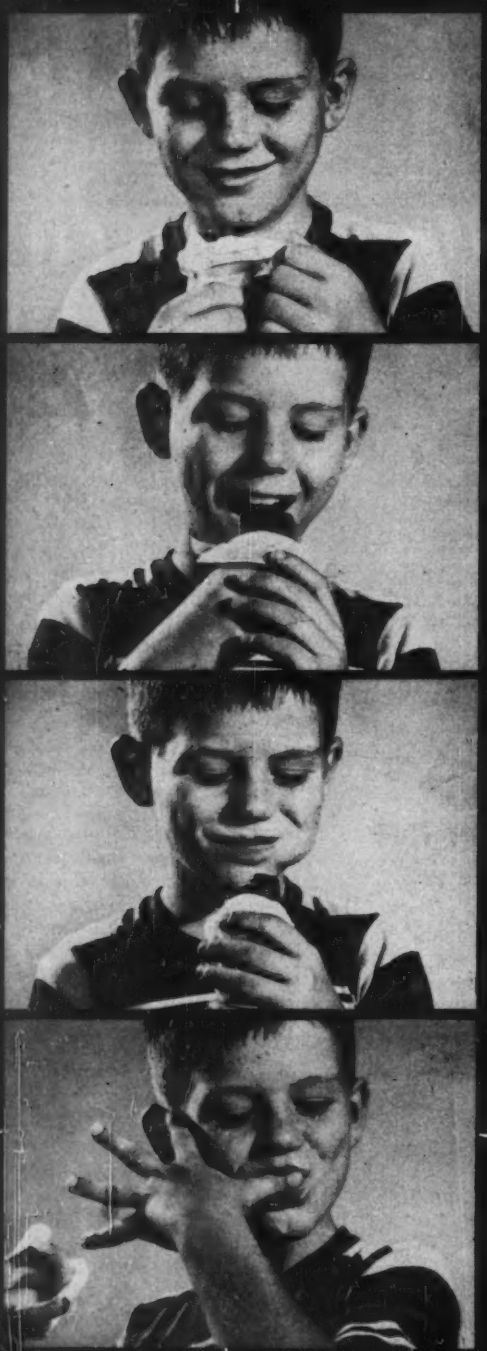
Tube consists of a flanged cylindrical body designed with a short, straight inlet section terminating with an abrupt decrease in diameter, or "inlet shoulder", which is followed by a conical restriction and a diverging outlet separated by a narrow annular gap called the "slotted throat annulus".

Four equally spaced inlet pressure piezometer holes are drilled through the body tangent to the inlet shoulder. For enduring, accurate metering, these holes are provided with bushings of bronze, or other corrosion-resistant metal, with sharp inside corners, free from burrs, set flush with inside wall of tube. Each of piezometer holes is tapped at outside wall. One of tapped holes, preferably one nearest to horizontal axis, is used for connection with high pressure chamber of a metering instrument. Other tapped holes are plugged and can be used for drain and air or gas vent connection.

Four other piezometer holes are drilled through body to connect with annular throat slot. Each of these holes is tapped and one, preferably one nearest to horizontal axis, is used for connection with low pressure chamber of metering instrument.

Tube liner, comprising throat section and part of inlet and outlet cones, is constructed of bronze, or other special material. Internal cylindrical sections adjacent to throat slot are concentric within extremely close limits. Primary purpose of liner is to maintain original contour and dimensions of tube at critical areas for many

Pep up the flavor of compound coatings with Monsanto Ethavan and Vanillin



To put new zest into your hard butter coatings try Monsanto Ethavan or Vanillin. They are particularly important because hard butter coatings absorb more flavor than older-type cocoa butter coatings.

Better still, Monsanto Ethavan and Vanillin have high "staying power," retain their flavor during hot processing.

Monsanto Ethavan and Vanillin come to you in the form of pure, fine crystals and can be added to a compound without diluting or lowering the viscosity.

Next time, add either of these two fine products to your formulation or specify them to your flavor supplier.

For more information on the use of these ingredients in compound coatings, call the Monsanto office near you, or write: Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Box 478, St. Louis 1, Missouri.

Ethavan: Reg. U. S. Pat. Off.

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years. Liners are carefully finished to specified diameters, profile and slot dimensions to obtain high metering accuracy.

As fluid moves through "inlet cone" there is a rapid increase in velocity with a corresponding decrease in pressure. When slotted throat annulus is reached, velocity of flowing fluid may be many times velocity at inlet. After passing throat, fluid enters "outlet cone" in which velocity is decreased and a highly efficient, nearly complete recovery of differential pressure results.

Inlet shoulder immediately preceding conical restriction has little effect on head loss conditions, but provides a stabilizing influence on discharge coefficient throughout operating flow range. Since inlet shoulder is part of bronze liner, a sharp upstream edge, free from burrs, can be maintained throughout life of tube. However, tests have shown that rounding of this edge has little effect on accuracy.—*Builders-Providence, Inc., Providence, R. I.*

Circle 127B on Reader Service Card

Heater Protects Bulk-Tanker Equipment

This new type heating system eliminates freezing problems common to bulk-milk-tanker cabinets under severe winter conditions.

Unit consists of a hot water blower type heater which is mounted out of the way, in mechanical compartment of truck cabinet. It is controlled by a variable speed switch installed in front cab.

Driver just switches heater on as he starts his run, and before first pick up, cabinet is heated to a point where outside temperatures have no effect on hose, doors, door gaskets or other equipment that is vital to smooth operation.

Repeated opening of cabinet doors, do not affect quick reheating of cabinet. System rapidly brings temperature up in a matter of minutes after doors are closed, preventing ice from forming along bottom of cabinet doors, a condition that makes airtight sealing extremely difficult.

In operation, air is drawn into heater through a stainless steel grill on right side of cabinet. This grill is located near cabinet floor. Intake connection is protected from wash waters and other foreign matter by a stainless steel boot.

The flow of cold air then passes through heater into a 2 in. flexible hose that is guided into blind space above cabinet. Here it again enters cabinet through a stainless steel grill warm air outlet located directly above coiled plastic hose. Thrust of warm air down on hose keeps it pliable for instant use and eliminates problem of uncoiling frozen hose. Only air circulated is air already in cabinet, preventing contamination from outside. As an added sanitary measure, all intake and outlet connections are stainless steel.

System operates off hot water from engine's cooling system. Water is circulated to heater through hoses connected to both units. This arrangement of using truck's cooling system does not affect efficiency or output of cab heater, as both units operate independently.—*Walker Stainless Equipment Co., New Lisbon, Wis.*

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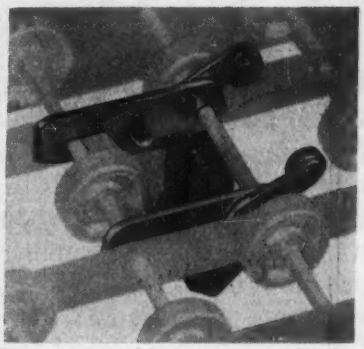

Accurately Counts Packages On Wheel Conveyor

An accurate, automatic check of the exact number of cartons or packages that have passed over a section of gravity wheel conveyor is provided with this new counter.

Handy unit fits on maker's 12-RS-6 or 12-RS-10 gravity wheel conveyors without rearrangement of wheels or on other models of 12 or 18 in. wide conveyors by removing or rearranging one or two wheels.

When an item of merchandise depresses the free-wheeling rollers on counter arms, counter is actuated by one digit. Unit counts up to 99,999, then starts over. Knurled knob is provided for resetting unit manually.—*Rapids-Standard Company, Inc., 342 Rapistan Bldg., Grand Rapids 2.*

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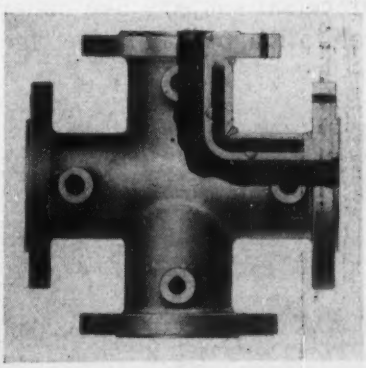

Jacketed-Cross Holds Flow Temperatures

This new forged steel jacketed cross has been designed for use where flow characteristics are a major factor. Seamless cross is said to offer superior temperature and corrosion characteristics due to its forged construction.

Cross is produced in standard sizes from ¾ to 12 in. for temperature serv-

NEW PROCESSES

A new one for YOU may crop up in a different kind of plant! Good example of this is quick freezing. (Whether you freeze or not, it holds a lesson for *you*.) It began in the '20s with fish. Next, meat. In 1930 only 20 plants were quick freezing commercially—only 1 produced fruits. 1933 brought quick-frozen vegetables. Then came fruit juices and poultry. By 1940, pre-cooked foods had made a start. On rolled the tidal wave of food engineering . . . and today the housewife buys frozen breads and blintzes, potatoes and pot pies, venison and vichyssoise.

Typical. Brewer, baker, candy-maker—whatever your *kind* of food plant, you can learn from *other* kinds. You are smart to read how *your problems* are solved in food plants different than your own.

How to keep up with new ideas in other kinds of food plants: FOOD ENGINEERING reports on every plant management, engineering, and operating subject. Its stories on *your* kind of plant are unexcelled in accuracy and detail. And, equally important, FE reports on useful ideas in *other* kinds of food plants—universal subjects like materials-handling, sanitation, packaging, refrigeration.

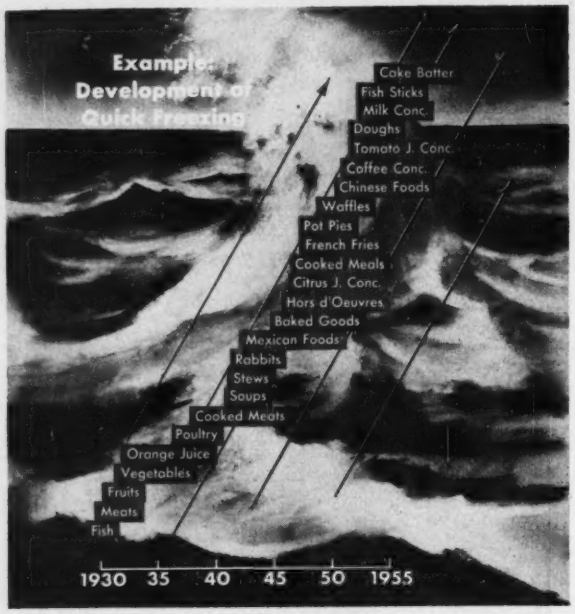

Chart above shows how "tidal wave of engineering" carried quick-freezing from one kind of food plant to another . . . as it can carry new methods to you.

This important service has brought FE more subscribers than any other food-plant magazine . . . people who want *complete, accurate* operating news. People who no longer sit behind the artificial walls dividing food into many "industries," shutting out profitable new ideas. *Try* it—*now!* Look over *your* wall with FOOD ENGINEERING.

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ice up to 800 deg. F. Crosses for larger sized lines and higher temperatures are available on a custom basis. Pressures up to 300 psi. can be handled without welding neck flanges. In addition to standard crosses, designs available include crosses of straight sizes on the run with reducing branch outlets.

Available in forged carbon steel and stainless steel, as well as in aluminum and other materials, cross may be installed in any position.—*Jacketed Piping & Products Co., 503 Columbia Bldg., Pittsburgh 22.*

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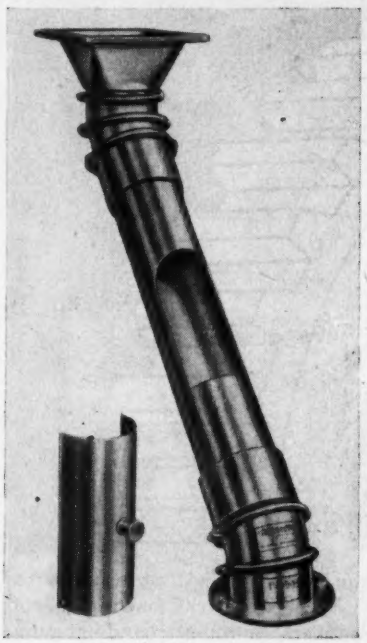

New Sanitary Spouting Is Easy to Install

Unskilled labor can install this new spouting easily and economically. Only tools required are a file, hacksaw, and hammer. Called Pneu-Spout, it is designed for sanitary, dust-tight handling of non-abrasive materials. Unit takes up minimum amount of space and is easily cleaned and maintained.

Manufacturer points out that spout can be dismantled and reused elsewhere with a minimum of waste. Complete spouts are assembled with seamless tubing, adjustable elbows, angles and fittings all made of long-life aluminum alloy. They are available immediately.—*The Day Co., 810 Third Ave. N.E., Minneapolis 13.*

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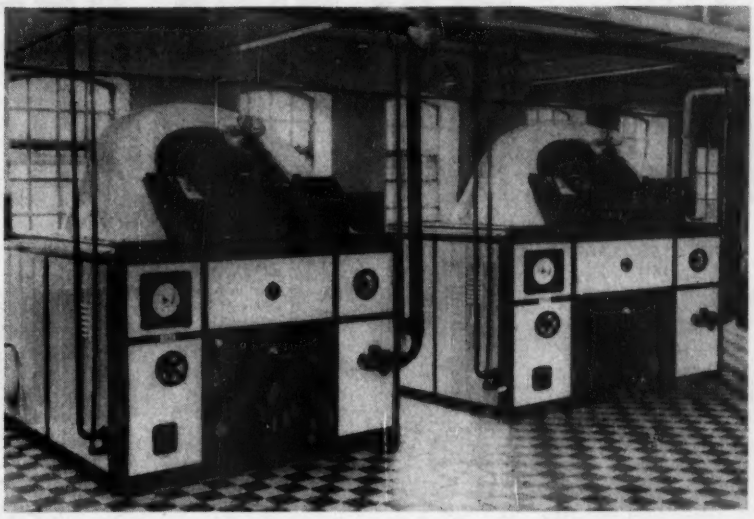

Cuts Chocolate Conching Time From Days To Hours

Time required in conching of chocolate is reduced from several days to 8 hr. with this new machine. Known as the Bauermeister rotory-conche RO 512, it is employed for the conching and refining of liquid or dry chocolate masses. Machine features internal scraping arms which revolve contrawise to container.

Unit will produce fine results without excessive time and expense formerly required. Now, removal of water and acetic acid from chocolate mass is achieved by exposing mass particles to air, thoroughly and intensively, within rotating container. An activated pump alternately draws in and expells air throughout mass which cascades toward bottom of slanted container. Complete oxidation is thereby achieved.

After processing, chocolate mass is discharged from container by means of a built-in pump capable of easily pumping mass into distant storage tanks or other processing machines. By this operation, entire contents of container can be emptied within 10 to 15 min. Entire container is jacketed for hot water and can be heated up to 212 deg. F.

Unit is extremely effective with dry chocolate masses in dispelling water and flavor-inhibiting acids. Cocoa butter, which retards evaporation, can be added to mass at a later stage of refining process.—*Geveke & Co., 26 Broadway, New York City 4.*

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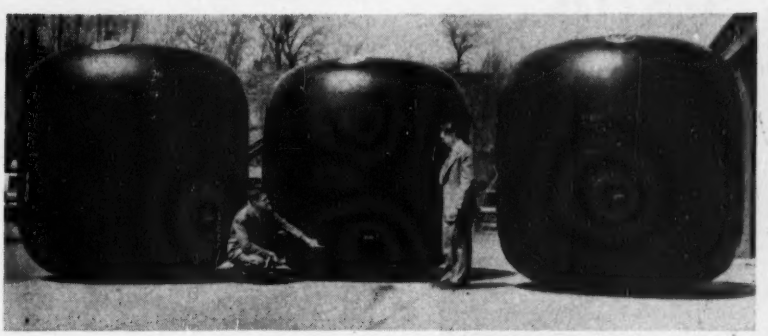

Bulk Carriers Offer Three-Way Savings

With use of these new synthetic rubber and fabric containers, processors of granular and powdery materials can save three ways. They reduce handling and packaging costs at point of origin, and permit low-cost bulk shipment. Further, they simplify receiving and handling efforts of the user.

The containers, made in 500 and 2,500 gal. sizes, can be collapsed after emptying for return and re-use. They are now being used by some leading companies for bulk shipment of chemicals, and are being widely tested for

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Colorfully printed "Cel-O-Seal" bands add that extra touch of eye appeal to your package . . . promote brand identification . . . let you put your sales slogan or selling message where it must be seen. And they give your product extra, tamperproof protection. Consumers recognize "Cel-O-Seal" as the sign of a protected, high-quality product.

Find out more about the new package improvement possible with "Cel-O-Seal." Write for the names of suppliers of automatic banding equipment. And to see what "Cel-O-Seal" can do for *your* bottle, send us a labeled dummy of your bottle. Our packaging experts will band it, return it for your inspection. Write: E. I. du Pont de Nemours & Co. (Inc.), "Cel-O-Seal" Section FE, 10-414 Nemours Bldg., Wilmington 98, Delaware.

"Cel-O-Seal" cellulose bands are also sold by Armstrong Cork Co., Lancaster, Pa., and on the West Coast by I. F. Schnier Co., San Francisco, California.

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

bulk shipment of starch, flour, sugar, malt and many corrosive and hygroscopic materials. Arrangements are now being made by maker for manufacturers to lease containers at a monthly rate if desired.

The 370 cu. ft., or 2,500 gal. container, is 8 ft. in dia. and 8 ft. high. Air or gas can be pumped into filled container to provide additional rigidity during handling. Collapsed for storage or return shipment, it is 8 ft. long, 8 ft. wide and 2 ft. high.

The 70 cu. ft., or 500 gal. container, is 3 ft., 10 in. in dia. and 7 ft. high. Collapsed for storage or return shipment, it is 6 ft., 4 in. long, 3 ft. wide and 10 in. high.

Both containers can be shipped by barge, rail or truck. They can be stored outdoors or indoors at point of origin, in transit or at destination by user. They are termed tough, noncorrosive, vermin-proof, leak-proof and weatherproof, and are practical to fill, empty and clean.

Containers are built like a tire with a number of plies of high strength cord fabric and synthetic rubber molded into one piece. Extra plies are used at points of greater stress. They are internally reinforced by several strong, flexible lifting cables, which are attached to a single lifting ring at top. Rugged, resilient construction enables containers to withstand continued hard service without damage to themselves or loss of contents.

Exterior and inner lining are neoprene rubber, providing high resistance to aging, weathering, abrasion and contact with oils and corrosive chemicals. Containers have a 6 in. closure in each end for easy emptying and filling. Company has been manufacturing collapsible containers in 55 gal. size since early 1951.—*U. S. Rubber Co., Providence, R. I.*

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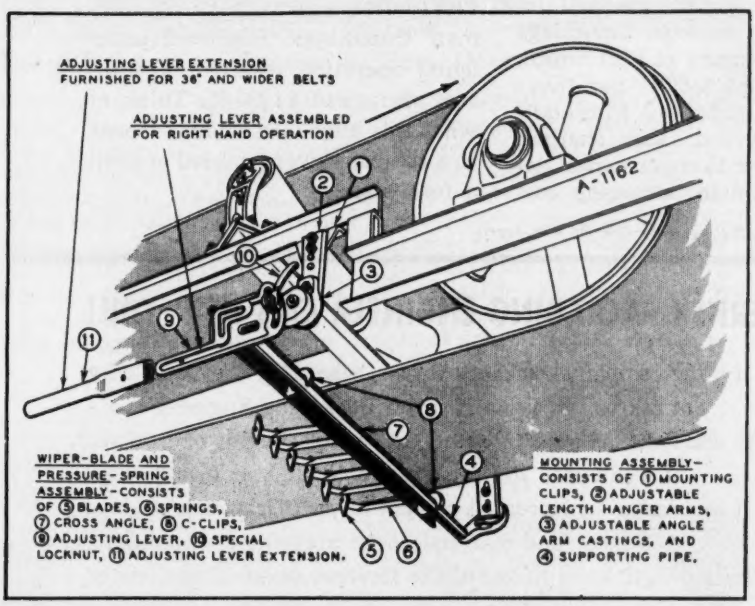
ADJUSTING LEVER EXTENSION FURNISHED FOR 36" AND WIDER BELTS
ADJUSTING LEVER ASSEMBLED FOR RIGHT HAND OPERATION
A-1162
WIPER-BLADE AND PRESSURE-SPRING ASSEMBLY - CONSISTS OF ⑤ BLADES, ⑥ SPRINGS, ⑦ CROSS ANGLE, ⑧ C-CLIPS, ⑨ ADJUSTING LEVER, ⑩ SPECIAL LOCKNUT, ⑪ ADJUSTING LEVER EXTENSION.
MOUNTING ASSEMBLY - CONSISTS OF ① MOUNTING CLIPS, ② ADJUSTABLE LENGTH HANGER ARMS, ③ ADJUSTABLE ANGLE ARM CASTINGS, AND ④ SUPPORTING PIPE.

Belt Cleaner Removes Clinging Material

This spring type conveyor cleaner removes material adhering to the belt after discharge, extending belt life by preventing cover wear. Steel wiper blades perpendicular to belt surface, but diagonal to its line of travel, scrape off material, allowing it to fall to discharge chute. Since wiper blades are mounted on spring arms, pressure against belt can be adjusted for different operating conditions.

Formerly, these spring steel arms exposed a flat surface to dribble falling from wiper blades, allowing some material to build up on flat surface. To remedy this condition the new cleaner design incorporates a twist in the arm so that a vertical edge is exposed to the dribble falling from the wiper blades. This eliminates any build-up on the arms.

Cleaner uses no moving parts and is designed with adjustable mounting brackets to fit any belt conveyor head pulley assembly. — *Stephens-Adamson Mfg. Co., Aurora, Ill.*

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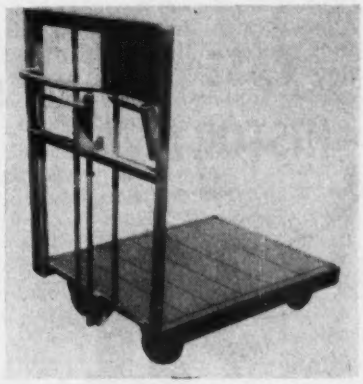

Dragline Trucks Are Easy to Engage

The adjustable drop pin on these new four wheel dragline trucks makes them easy to engage or release from the conveyor system. They are available in two types—for in-floor (illustrated) and overhead dragline conveyors.

Other truck features are: deck constructed of tongue and grooved, kiln-dried hardwood and protected on all four sides by structural steel. All wheels are rubber tired with metal hubs. Sealed bearings in both caster and main wheels require no periodic lubrication—once-a-year flushing is only lubrication ever required. Swivel action of caster operates on 2 rows of balls running in hardened raceways and provides longer caster life and easier swiveling.—*Lewis-Shepard Products, Inc., Watertown, Mass.*

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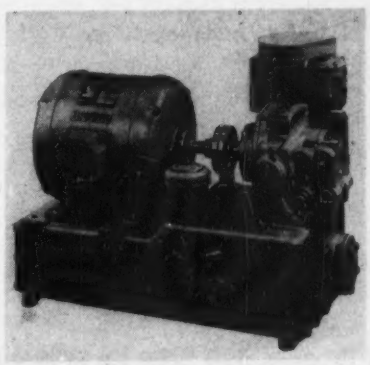

Variable Delivery Pump For Drive Applications

A new line of one-, and two-way variable delivery pumps is offered for variable speed, straight line and rotary drive applications requiring 1 to 3 hp. under precise speed or pressure control. Each pump is a complete pack-

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CASE HISTORY

From the current files of the Hoerner Corporation

Re: Ballman Cummings Furniture Co.

$4,292.98

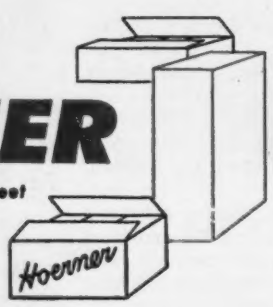
saved through improved packaging*

Up until late 1952, when a Hoerner Packaging Engineer appeared on the scene, the Ballman Cummings Furniture Company of Fort Smith, Arkansas, spent $569.41 per thousand toilet units packed. Plus additional freight and labor charges. Through a new Hoerner carton design the complete packaging cost per thousand units was reduced to $261.05. In the fiscal year 1953, Ballman Cummings' improved packaging operation resulted in a direct savings of $4,292.98. Think of what this kind of a savings means to a company over a period of even a few years!

*The Hoerner Packaging Engineer responsible: Mr. A. N. Rogers

HOW A HOERNER PACKAGING ENGINEER CAN HELP YOU!

If your company packages things, whatever they are, why not ask us to have a Hoerner Packaging Engineer come in and make an objective study of your packaging operations. It won't cost you a cent or obligate you in any way. It can mean an increased margin of profit through savings in labor and material costs, prevention of shipping losses. Just write to one of the Hoerner plants listed below.



SALES OFFICES: 209 S. LaSalle St., Chicago 4
50 E. 42nd St., New York 17

HOERNER BOXES, INC.

GENERAL OFFICE: 600 Morgan Street
Keokuk, Iowa

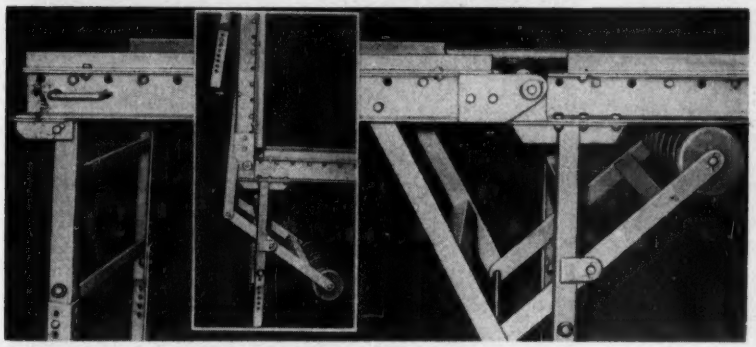
PLANTS—Keokuk, Des Moines and Ottumwa, Iowa
Sand Springs, Oklahoma; Minneapolis, Minnesota
Fort Worth, Texas; Sioux Falls, South Dakota
Fort Smith and Little Rock, Arkansas

Packaging Engineers Designers and manufacturers of corrugated boxes.

age unit incorporating a variable delivery, high pressure, radial piston pump with patented, balanced flat valve, a constant delivery, low pressure gear pump (small and large size), one of eight standard controls, a three-way suction and return valve for differential systems, a double acting high pressure relief valve and a gear pump relief valve.

Compact hand-screw, hydraulic servo-motor lever, automatic adjustable pressure unloading, hydraulic remote, electric remote, electric-hydraulic servo and pneumatic controls mount on either side of pump case. These pumps can be mounted on reservoirs integral with machine or furnished with standard oil reservoirs for mounting both pump and electric drive motor.—*Oilgear Co., 1560 W. Pierce St., Milwaukee 4.*

Circle 133C on Reader Service Card

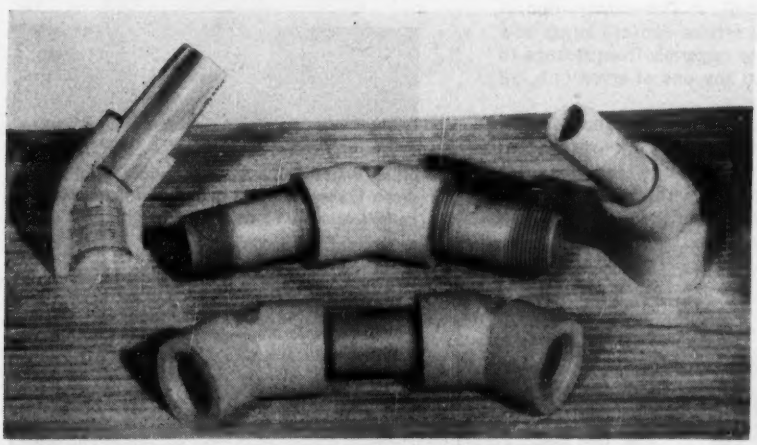


Hinged Conveyor Section—"Easy Does It"

Where frequent openings of the conveyor are necessary, increased efficiency is attained with newly designed structure for the hinged section of roller conveyors. Advantages of new type of hinge construction are claimed to more than offset increased cost over conventional counterweighted arm type hinged sections.

First, by placing counterweight beneath conveyor instead of to side, as on conventional units, the weight and supporting arms are compact, take less floor space and will not interfere in any way with products being conveyed. Second, construction of new section requires practically same effort to hinge through its entire movement. There is no straining on initial lift nor is a retarding effort necessary as section nears vertical position.—*The Alvey-Ferguson Co., Cincinnati 9.*

Circle 135A on Reader Service Card



Rigid Plastic Pipe Is Tough, Non Corrosive

High impact resistance, toughness and corrosion resistance are features claimed for this new rigid plastic pipe. Called Dur-Ace, it is a general-purpose material capable of handling most common corrosives.

Pipe is light in weight, odorless, tasteless, and non-contaminating. It has excellent resistance to all inorganic acids and alkalis with exception of a few strong acids. It maintains good strength, rigidity and chemical resistance over a temperature range of from −40 to 170 deg. F.

Maintenance painting, even in the presence of strong corrosive fumes, is eliminated since outside surface is also corrosion-resistant. Electrolytic corrosion, bacteria, fungus, etc., have no effect on pipe, hence it is adaptable for many outdoor applications such as buried water-lines, brine lines, etc.

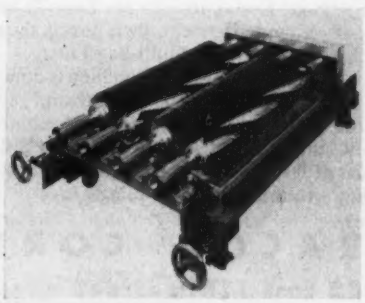
Pipe is now supplied in sizes from ½ to 2 in., in standard 20 ft. lengths, with choice of two wall thicknesses: Extra heavy duty (IPS Schedule 80), and Standard (IPS Schedule 40). Fittings, flanges, nipples, are also available with standard IPS threads.

Working pressures at 70 deg. F for the extra-heavy-wall pipe range from 300 psi. for ½ in. pipe to 150 psi. for 2 in. pipe. Standard-wall working pressures range from 150 psi. for ½ in. pipe to 75 psi. for 2 in. pipe. Maximum working pressures of thermo-plastic pipe are reduced as temperature goes up, and the value for pipe at 170 deg. F. is about half that at 70 F. These working pressures are based on a safety factor of 5 to 1.

Pipe is not recommended for temperatures above 170 deg. F., nor for temperatures below −20 F. where physical shock is present.

Pipe is easily threaded with standard pipe-threading tools or machines. Pipe can be bent in regular pipe forming equipment if it is first heated to soften it.—*American Hard Rubber Co., 93 Worth St., New York City.*

Circle 135B on Reader Service Card

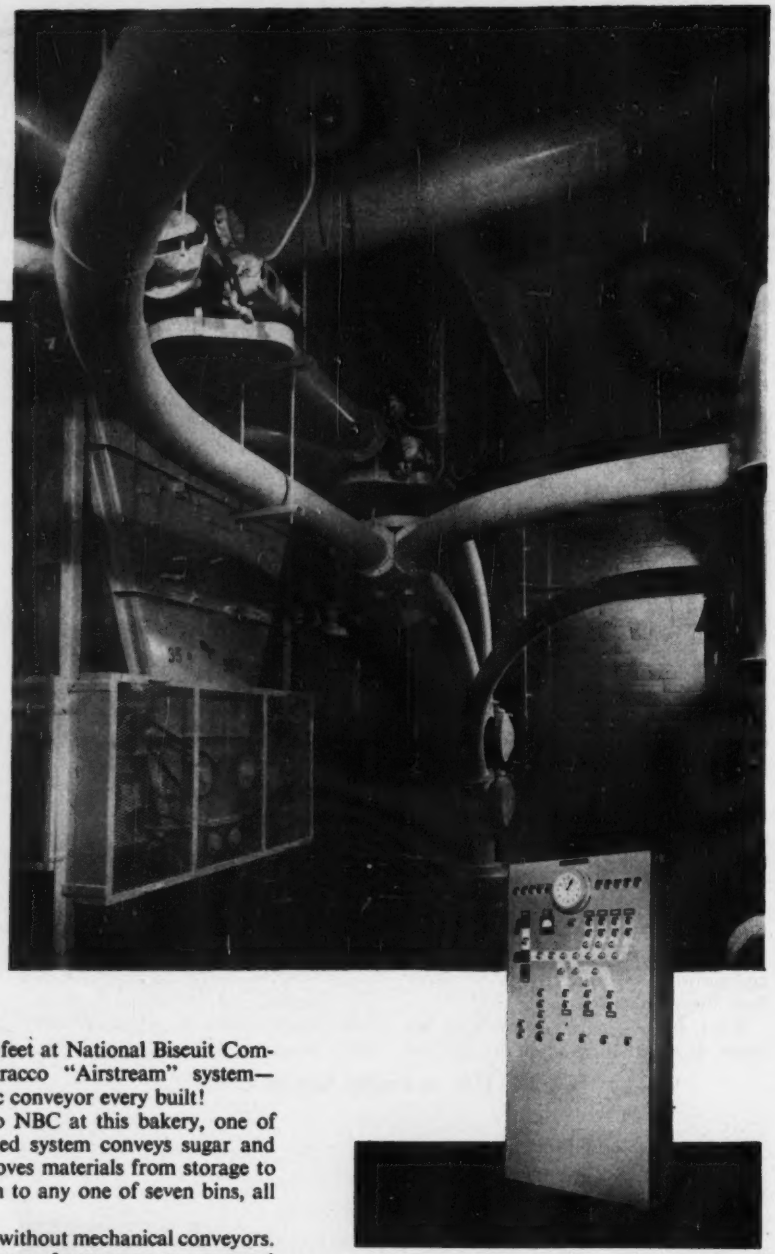


Belt Scrubber Removes Baked-On Particles

This new bakery conveyor scrubber is said to remove baked-on particles of sugar and dough easily from endless stainless steel conveyors.

For use in large bakeries where endless stainless steel conveyor belts carry

here's a seven-armed baker's helper!



Stretching in serpentine-fashion for 800 feet at National Biscuit Company's new Chicago bakery is a Dracco "Airstream" system—probably the longest pressure-type pneumatic conveyor every built!

Absolute cleanliness is a vital necessity to NBC at this bakery, one of the world's largest. Dracco's custom-designed system conveys sugar and flour without loss at 10 tons per hour. It moves materials from storage to the processing department, then directs them to any one of seven bins, all ventilated by a Dracco Multi-Bag Filter.

This high-speed, dust-free handling is done without mechanical conveyors. The completely automatic "Airstream" system features motor-operated diverter gates and is run from a single control panel.

NBC thus realizes sanitary materials distribution with economy that is typical of Dracco "Airstream" installations throughout industry.

How's your materials handling?

NERVE CENTER—diagrammatic control panel shows layout of seven-armed Dracco Conveyor, permits centralized one-man operation.

DRACCO CORPORATION

4085 East 116th Street • Cleveland 5, Ohio

For further information on bulk materials handling with Dracco "Airstream" Conveyors, send today for Bulletin 529.

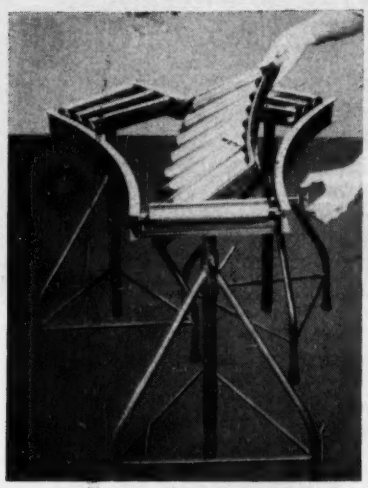
DRACCO *Performance Proved*

Airstream **CONVEYORS · DUST CONTROL EQUIPMENT**

dough through baking ovens, this unit removes baked-on particles from the belt on its return passage under the ovens. For best results, maker's recommend that conveyor belt back-up roll be suspended from oven frame, and scrubber installed on floor under belt. Proper contact between belt and brushes is maintained by adjustable jack screws on scrubber.

New machine uses four cylinder brushes, two for scrubbing and two for buffing. All four brushes are 40 in. long with 7½ in. overall dia and 2⅜ in. trim. Buffing brushes are of crimped nylon; scrubbing brushes are of crimped oil tempered wire. Bakery conveyor scrubber is powered by two ½ hp. motors, each geared to two brushes.—*Fuller Brush Co., Industrial Div., Hartford 2, Conn.*

Circle 135C on Reader Service Card



Flip Action Diverts Flow of Packages

Change in flow direction, in the handling of boxes, cases, cartons on gravity wheel or roller conveyors, is simplified with this new "Y" flipswitch. Unit is completely portable; light and easy to move to any point for speedier handling operations.

Made with steel ball bearing rollers, flipswitch is two 45 deg. curves in form of a "Y". It can move material in either direction, left or right, by simple flipping.

New item is available in 12, 15, or 18 in. widths. It can easily be made to provide 90 deg. turns by using two extra standard curves.—*Speedways Conveyors, Inc., Speedways Bldg., 202 Rhode Island St., Buffalo 13, N. Y.*

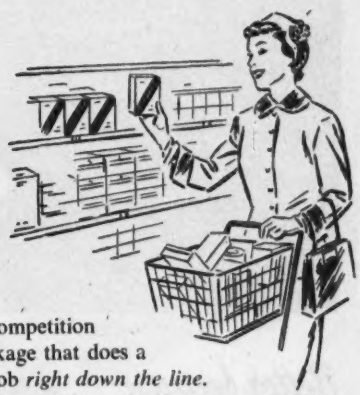
Circle 137A on Reader Service Card

Your package must

SELL THE WHOLESALER

SELL THE RETAILER

SELL THE CONSUMER



Today's keen competition calls for a package that does a strong selling job *right down the line.*

Such a package that embodies proven selling features helps your salesmen open new accounts . . . It rates prominent display on dealers' shelves . . . Catches the eye of shoppers and induces impulse sales... Keeps your product in first-class condition so that it will be enjoyed at its very best . . . And if, in addition, the package is easy to open and convenient to use, it will help win friends and repeat sales.

For over 40 years we have originated and built machines which produce packages that sell. We know what types of packages are best suited to various products and can supply a machine specifically adapted to your production set-up.

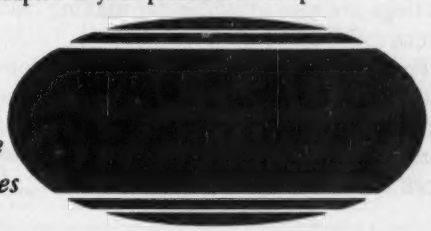
✓

GET OUR SUGGESTIONS

We would like to have our engineering and designing staff make suggestions for improving your package and lowering your costs.

Write or phone and a representative will call.

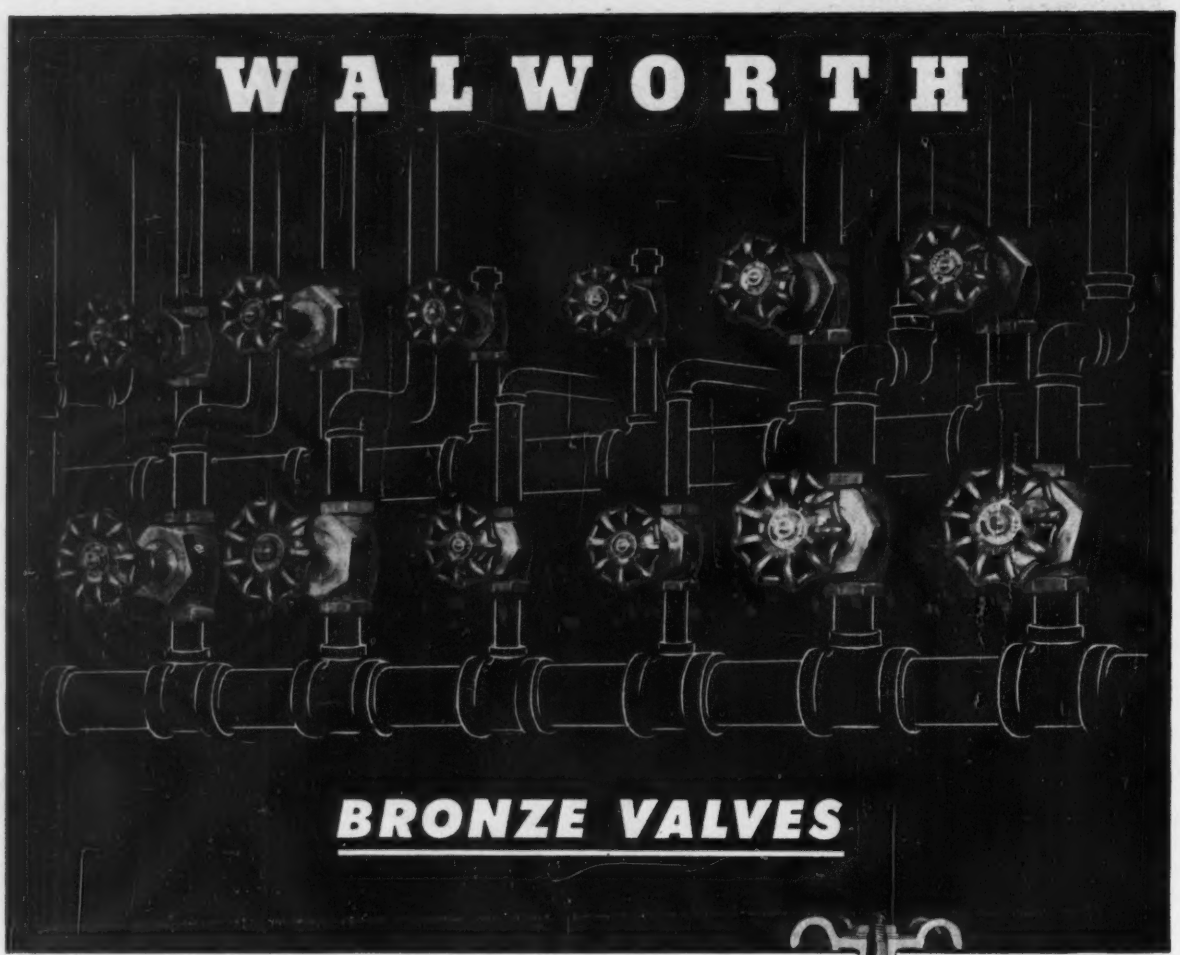
Write for descriptive folder on our machines



NEW YORK PHILADELPHIA BOSTON CLEVELAND CHICAGO ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

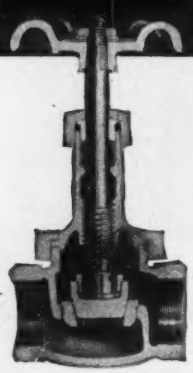
For more information, use coupon on last page.

WALWORTH



BRONZE VALVES

Better because ... **Walworth has standardized its line of bronze valves to provide an unsurpassed system of interchangeability of parts for assembly or replacement. You can maintain a great number of Walworth Bronze Valves with a small inventory of basic parts . . . you minimize part replacement problems. For further information, ask us for our Bronze Valve Standardization Chart.**



Parts are carefully machined and finished to close tolerances, thereby assuring accurate fit and alignment under all conditions. Sectioned valve is Walworth No. 225P Bronze Globe Valve with stainless steel plug-type seat and disc, heat-treated to a minimum of 500 Brinell hardness.

Choose from complete lines of Walworth Bronze Valves – including gate, globe, angle, check, and lubricated plug types. Walseal® Bronze Valves and Fittings are also available for making silver-brazed joints.

For full information on Walworth Bronze Valves and Fittings, call your Walworth Distributor, nearest Walworth Sales Office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Unskilled Can Weld With New Machine

Simplified maintenance of metal equipment is reported with a new method of welding. Known as Selfweld, it eliminates skills normally required through use of a new 100 amp. welding machine.

Selfwelding employs a special electrode and holder. To make a weld, tip of electrode is simply held against metals to be joined at point where weld begins, a switch is pressed to fire electrode, and electrode automatically makes weld itself. Electrode and holder do work normally required of person welding. Metal can be melted and fused together without holder even being touched after arc is started. A supporting leg can be used to keep holder in correct position. Excellent welds are reported on first try.

New machine called the Linewelder 100, can be operated safely on standard, properly fused 115 or 230v. circuit. — *Lincoln Electric Co., Cleveland 17.*

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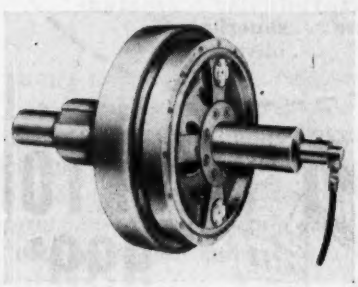

Ease of Control Marks New Air-Clutch

Quick action and ease of control is claimed for this new air clutch, called Air-Grip. It responds instantly to a touch of throttle because a minimum of air is used in operation of clutch. Sensitivity provides "finger-tip" con-

Only MOBILIFT gives you *Mobil-Matic* Drive*

with HYDRA-LIZER*

in the NEW
3,000 lbs. at 24"
4,000 lbs. at 24"
FORK LIFT TRUCKS

Model Shown, New M-324 with 83" Mast

More Operational and Service Features

- Easy to get on and off from either side.
- Spring mounted rear wheels for riding comfort.
- Combination ball bearing worm and nut type steering.
- One-piece hinged hood for easy access to engine compartment.

AND MANY OTHERS

*** MOBIL-MATIC DRIVE**

Fluid coupling, oil-immersed clutch, constant mesh transmission — a combination that transmits power smoothly and efficiently with minimum wear and service. There is NO CLUTCH PEDAL — just ONE push-pull forward and reverse lever!

*** HYDRA-LIZER**

Another Mobilift exclusive . . . equalizers mounted on each rear wheel and connected hydraulically to cross compensate the truck when the *front* or *rear* wheels pass over bumps or depressions.

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LAMSON MOBILIFT CORP.
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1112 Lamson St., Syracuse 1, N. Y.
Please send complete information on ☐ 3000- and ☐ 4000-lb. capacity units to:
Name_____ Title_____
Company_____
Address_____
City_____ Zone_____ State_____ 1208

For more information, use coupon on last page.

Sausage makers should use Morton '999' because of its milder, more uniform flavor. Its uniform granulation results in a more even dissolving rate and improved salt distribution throughout the sausage. Morton '999' has a minimum pro-oxidant effect. To insure good flavor and to prevent quality variations, Morton '999' Salt should also be used by makers and processors of candy . . . beer . . . canned foods . . . cereals . . . seasonings . . . meat . . . malted milk . . . mayonnaise . . . margarine . . . sauerkraut . . . olives.

MORTON '999' SALT insures uniform quality in processed foods for two reasons. It's guaranteed to contain more than 99.9% pure sodium chloride—*always!* The 0.1% (or less) is a neutral inert sodium salt—never bitter calcium or magnesium compounds.

Vacuum pan evaporation assures that this salt will be clean . . . free-flowing . . . evenly soluble. It has a constant weight per volume ratio . . . won't pack down.

MORTON SALT COMPANY
Industrial Division, Dept. SE-12
120 So. LaSalle St., Chicago 3, Illinois

I should like to have a Morton representative call and give me—without obligation—more information on Morton '999' Salt and methods of using it in my product.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

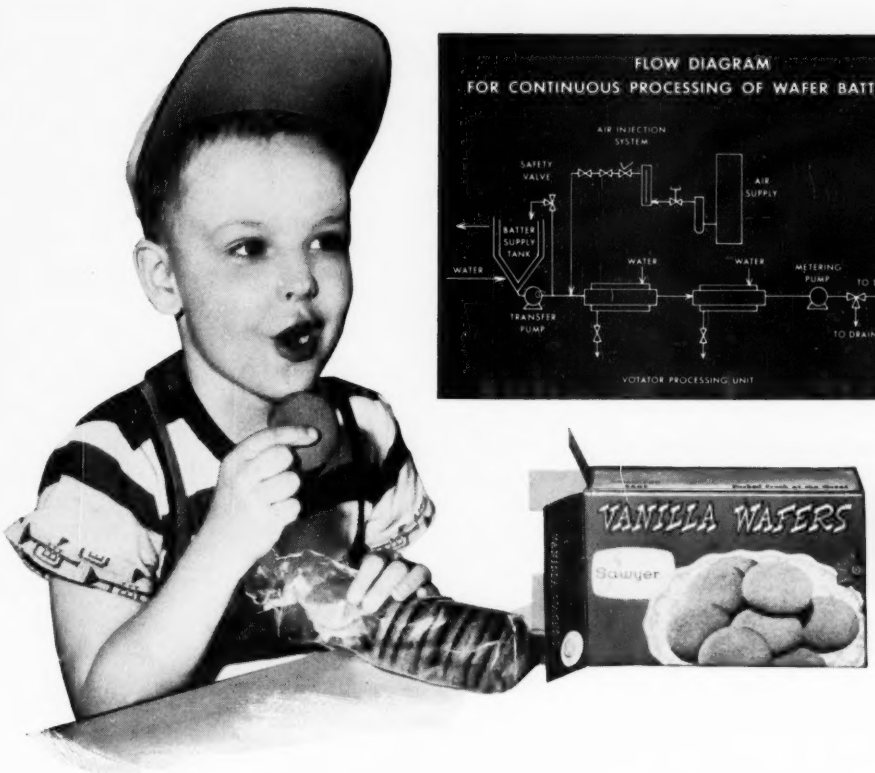
MORTON '999'

the salt that carries its own guarantee

Mail coupon for further details today!

You control product uniformity automatically with **Votator®**

CONTINUOUS PROCESSING APPARATUS...



COOLING

CHILLING

SLUSH FREEZING

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CRYSTALLIZING

PLASTICIZING

MIXING

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WHIPPING

COOKING

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M-M-M! modern method makes 'em perfect!

HERE'S how progressive bakeries are producing *better wafers at lower cost* with VOTATOR* Continuous Processing Apparatus. Positive control of temperatures and viscosities assures a perfectly *uniform batter* hour after hour, day in and day out. Wafers are uniform as to size, appearance and taste. It affords better mixing and more uniform aeration, which saves costly ingredients and cuts baking time.

This is typical of improvements being made in the manufacture of many food products with VOTATOR Continuous Processing Apparatus. It provides the most effective heat-transfer and mixing method yet devised. Its automatic control of product uniformity assures top sales appeal. Its closed system operation simplifies the clean-up and sanitizing problem. Find out how it can improve *your* processing and reduce costs.

*VOTATOR—Trade-Mark Reg. U. S. Pat. Off.

the **GIRDLER** Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

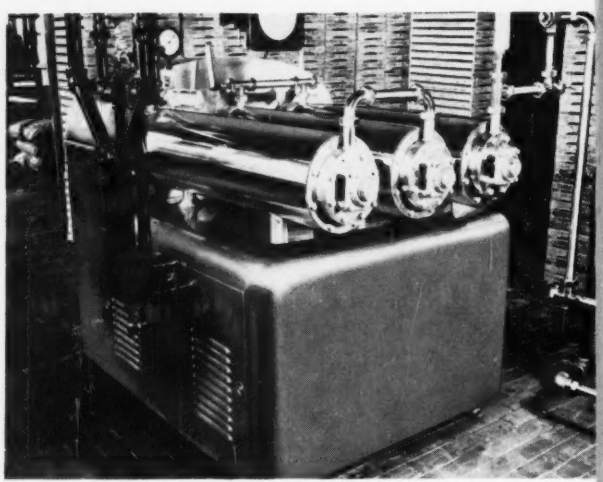
VOTATOR DIVISION

Mail Coupon for Information

GET GIRDLER ON THE JOB EARLY!

...Get complete service from process design to finished plant

Girdler engineers, on the ground floor of many food processing problems, have wide experience to assist you in your product development.



This VOTATOR Processing Unit replaces an open kettle method of cooking starch jellies. The present product is far superior. Costs have been slashed drastically.

WHEN MAKING PRELIMINARY plans for new construction or modernization of continuous processing facilities, you'll find it profitable to augment skills and facilities of your research and engineering staff with the specialized experience of Girdler's VOTATOR Division. This highly trained group of engineers and chemists has achieved many firsts in edible oil and food technology . . . has designed, engineered and installed scores of continuous processing plants from coast to coast. And, Girdler's modern pilot plant and laboratory facilities have helped many organizations bridge the gap between research and commercial production economically, and with sound results.

Why not put this broad experience and complete service to work on *your* problems? Mail the coupon today for further information on the processing of any of the products listed at the right.

*VOTATOR—Trade-Mark Reg. U. S. Pat. Off.

THESE PRODUCTS CAN BE PRODUCED BETTER WITH VOTATOR* CONTINUOUS PROCESSING APPARATUS

- Marshmallow
- Wafer and Cake Batter
- Cream Style Corn
- Dog Food
- Chocolate Milk Drink
- Edible Starch (For Salad Dressing)
- Pie Filling
- Soup
- Lard
- Margarine
- Shortening
- Sweetened Condensed Milk
- Invert Syrup
- Eggs
- Concentrates, Fruit Juices and Purees
- Juice Concentrates
- Starch Gum Jellies
- Strained Foods

THE GIRDLER COMPANY
224 East Broadway, Louisville 1, Kentucky

☐ Send further information on continuous processing of

_____

*Name*_____

*Position*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

the **GIRDLER** Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY
LOUISVILLE 1, KENTUCKY
VOTATOR DIVISION: New York, Atlanta, Chicago, San Francisco

trol and an ability either to "inch" the clutch or to throw it into full engagement, as required.

Instant disengagement of clutch is achieved by use of quick release valves built into clutch itself. These valves are optional equipment available when extra fast disengagement is desired.

Engineering advancements in unit include provisions for internal ventilation. This, plus fact that flexible air seal disk is so located that it does not come in contact with heat generating plates, results in cooler operation and longer life.

Another feature is provision for mechanical engagement of clutch in case air supply fails. Compact clutch occupies minimum space on shaft. It interchanges with and can be used to replace maker's or other mechanical clutches in existing installations. It is available from stock in single and double plate models from 8.5 to 806 hp. per 100 rpm. at 80 psi.—*Dodge Mfg. Corp., Mishawaka, Ind.*

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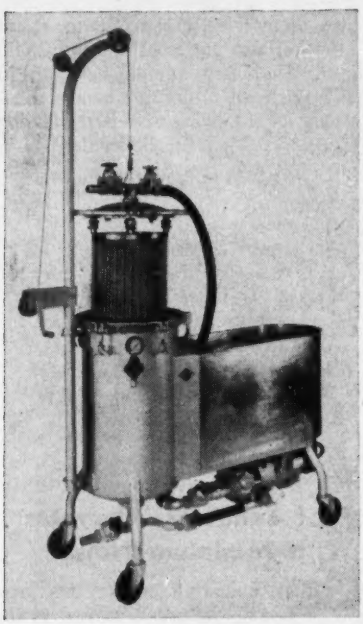

Compact Filter Has Large Area, Volume

Maximum filter area and volume is claimed for this new, space saving filter. Named the Sel-Rex filter, it can be used with either a new type stainless steel element or standard porous stone elements.

Double filtration area and volume is a feature of the new filter element constructed of corrugated stainless steel and wire mesh, which supports a

Felton's complete line of FELCOFIX powdered flavors offers you the best answer to the problem of permanently flavoring all kinds of dry, semi-dry or powdered products... completely eliminating that old shelf-life bugaboo!

These outstanding flavors are supplied as dry, perfectly homogeneous powders that remain fresh, true and delicious even when used in mixtures containing acids, sugars and other reactive ingredients.

Their concentration and lasting power are equally amazing, and result in economies that are important to your profits.

It will pay you to try our **FELCOFIX** *flavors without delay!*

Write now for Samples of these amazing new FELCOFIX* locked-in FLAVORS

FLAVORS • ESSENTIAL OILS • AROMATICS

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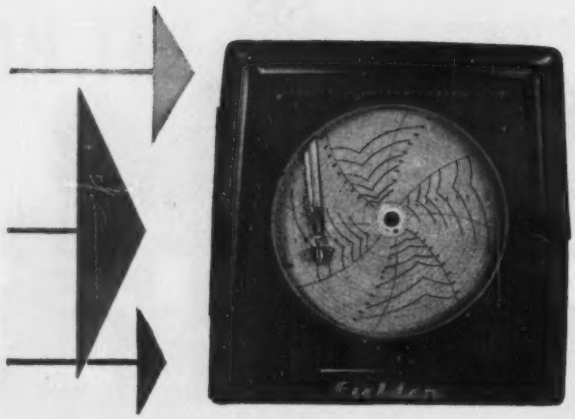
For more information, use coupon on last page.

must a well engineered chart recorder be expensive?



fielden says, "no!" when you can install a MULTIPOINT Recorder with up to 48 or 96 separate points—with each point available at a cost unheard of before!

Reason: Simplified design, circuitry, and construction. The chart mechanism is rugged, but so simple in form that there is little or no maintenance throughout the life of the instrument. Yet it's *accurate*—to ±½% of full scale, with a sensitivity of 0.1% and reproducibility of ±0.5%. Fielden furnishes 3 types of Multipoint Recorders: TEKTOLOG electrical quantity for pH, thermocouple and tachometry; A.C. NULL BALANCER for resistance temperature and conductivity measurements; and D.C. NULL BALANCER.

Does simplified, low cost—and reliable instrumentation appeal to you? Then use the coupon below today for full details.

Robertshaw-Fulton CONTROLS COMPANY

FIELDEN INSTRUMENT DIVISION
2920 N. 4th St., Dept. J, Philadelphia 33, Pa.
Send full details on the Fielden Multipoint Recorders checked below.
☐ TEKTOLOG Electronic Recorders ☐ A.C. NULL BALANCE Recorders
☐ D.C. NULL BALANCE Recorders

Name_____
Title_____
Company_____
Address_____ City_____ State_____

Equipment & Supplies

uniquely designed filter bag. Furnished in a variety of cloth materials, the bag type element is suitable for use with any type solution or liquid. If other types of filter media are desired, filter can be converted for use with porous stone. No additional parts are required for conversion.

Many features for practical and economical plant operation and maintenance have been incorporated into new unit. Entire filter element is attached to cover of tank, and is easily removed for quick inspection, cleaning or replacement. As optional equipment, larger models are fitted with a hand operated davit for lifting cover and element. All models have an extra capacity stainless steel precoat tank, to make precoating a one-step operation. For routine cleaning, unit can be backwashed. All operating valves are located at front of unit, and there is easy access to parts that require routine maintenance.

A complete range of sizes and capacities are now available, for both acid and alkaline solutions, portable and stationary models. Standard portable models have up to 20 sq. ft. of filtration area and a capacity of 2,000 gph. Stationary models have up to 175 sq. ft. of filtration area and a capacity of 18,000 gph.—*Bart-Messing Corp., 229 Main St., Belleville 9, N. J.*

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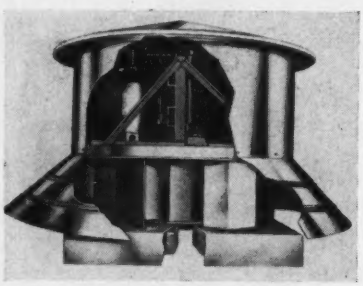


Roof Exhauster Operates With Minimum Noise

Quiet operation marks this new Type B roof exhauster, known as the Gyra-Flo. It is available with either direct or V-belt drive.

Noise level is kept to a minimum by an air-flow design which allows lowest possible wheel tip speeds. Air cut-off guide vanes are stationed at cut-off points simulating scroll design of a centrifugal fan housing and account for its high efficiency.

Frame is of heavy all-welded construction. Housing, motor and fan wheel can be removed without disturbing the unit. Housings can be furnished in aluminum, galvanized iron,

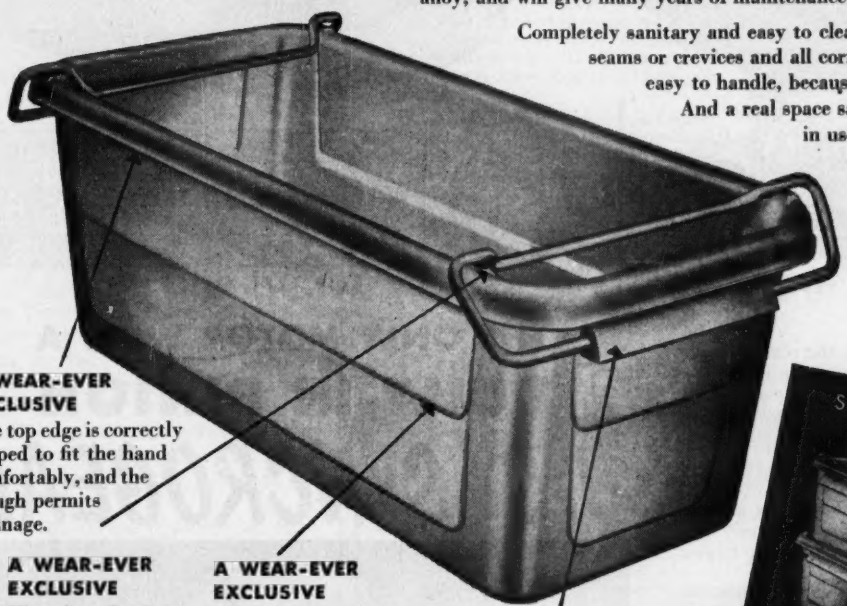
HAVE YOU SEEN THIS NEW WEAR·EVER ALUMINUM Tote Box?

No other food transport container gives you all these features:

This is the only transport box of its depth (12 inches) that is drawn seamless from a single sheet of metal. Yet it is made of extra tough, heavy-gauge aluminum alloy, and will give many years of maintenance-free service.

Completely sanitary and easy to clean because there are no cracks, seams or crevices and all corners are rounded. Light to lift, easy to handle, because it's made of *aluminum* alloy. And a real space saver because it not only stacks in use, but nests when empty. Mail coupon today for a Wear-Ever representative to call and show you this amazing new tote box.

Inside top measures
13½" x 32"
Inside bottom measures
11" x 29½"



A WEAR-EVER EXCLUSIVE
The top edge is correctly shaped to fit the hand comfortably, and the trough permits drainage.

A WEAR-EVER EXCLUSIVE
Wearing Strips brazed on top rim where handles rest.

A WEAR-EVER EXCLUSIVE
For extra strength, double embossing on sides and ends, triple debossing on the bottom.

A WEAR-EVER EXCLUSIVE
One long handle bracket (instead of two). Greater strength, is easier to clean.

WEAR·EVER

WEAR-EVER ALUMINUM TRADE MARK REG. U.S. PAT. OFF.

The Aluminum Cooking Utensil Company, Inc.,
312 Wear-Ever Bldg., New Kensington, Pa.
Please have a representative call and show us your new tote box with its exclusive features.

NAME .....

TITLE .....

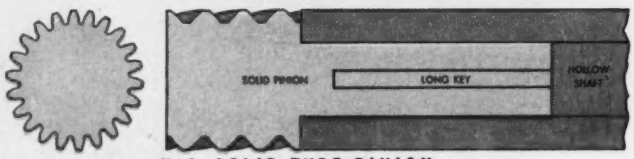
Fill in, clip to your letterhead and mail.

For more information, use coupon on last page.

In your opinion, which pinion?

. . . for longest life in a gearmotor

ORDINARY SHELL TYPE PINION



U. S. SOLID TYPE PINION

In an internally geared motor the pinion on the motor shaft is the vital link between motor and gearing. It's the fastest, but smallest gear, so it must be extra strong, free from vibration and forever tight. Now compare the U. S. Syncrogear motor pinion with the ordinary type. Note the extra large section area of the U. S. design. It has a long solid shank that anchors into the motor's hollow shaft, whereas the ordinary shell type has a small section area, short keyed.

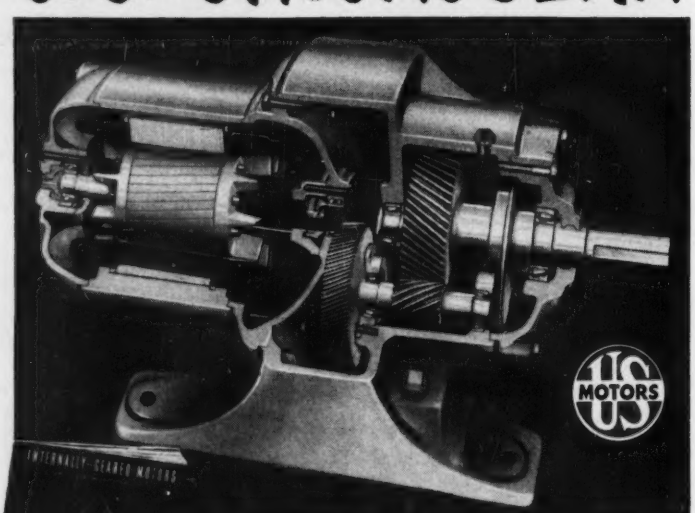
Obviously the U. S. design is most substantial, longer lasting, more resistant to deflection and can carry high speed loads far more safely than common designs. All the gears are deep-hardened and shaved to exact tolerances in the U. S. plants.

Added life lengthening features

The rugged pyramidal case supports the motor and gear train and all castings are normalized to insure permanent alignment and to prevent distortion. The motor windings are asbestos-protected to avoid carbonization and guard against burnouts. All moving parts are completely enclosed for weather and dust protection and confined within the least cubical dimensions on a single mounting. ¼ to 30 h.p.; 10 to 10,000 r.p.m.

THE ONLY MOTOR WITH A BUILT-IN PINION

U. S. SYNCROGEAR



FREE 16-PAGE DESCRIPTIVE BOOKLET GIVES ALL THE FACTS

Interesting multi-colored Booklet presents engineering facts you should know about geared motors, and illustrates the various U. S. Syncrogear types. Mail the Coupon for a copy. No obligation.

U. S. ELECTRICAL MOTORS Inc.

Los Angeles 54, Calif. **Milford, Conn.**

U. S. Electrical Motors Inc. **FE-12**
Box 2058, Los Angeles 54, Calif. or Milford, Conn.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

copper, stainless steel or any other special metals.

The wheel is backward curve type, of all-welded construction with ⅛ in. thick fins, ¼ in. back plate and heavy hub, welded securely together, then balanced statically and dynamically for vibrationless operation. They can be furnished in stainless steel as well as other alloys.

The discharge cone is designed to utilize spin of air which is discharged off peripheral edge of wheel to enter surrounding atmosphere with an absolute minimum of turbulence and discharge loss.

Base supports are constructed of structural angles and heavy steel plate, floated on vibration eliminators of rubber so there is no metallic contact between driving assembly and rest of exhauster. This eliminates magnetic hum and vibration.

Motor is completely isolated from exhausting air and can be furnished for any current characteristics. They are furnished either standard open, totally enclosed or explosion proof. V-belt drives are supplied in either single or multiple belt types. Motor base is mounted on sliding rails for simple V-belt adjustment.

Safety disconnect switches, approved by the Underwriter Laboratories, are furnished with each exhauster.

Further, automatic louvers, either air or motor operated, and which are easily mounted inside the curb, can be furnished.

Moreover, all louver blades are felt-lined, eliminating any noise when closing.

Exhausters are shipped fully assembled, complete with motor, drive assembly, frame, housing and safety switch for easy installation. Exhausters deliver from 830 to 2,590 cfm. in sizes ranging from 107 to 150 with static pressures from ⅛ to ¾ in. V-belt drives deliver from 1,420 to 29,750 cfm. in fan sizes from 122 to 440 with static pressures of ⅛ to ¾ in.—*Chicago Blower Corp. 9867 Pacific Ave, Franklin Park, Ill.*

Circle 144A on Reader Service Card

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—back of book. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.

for Economy... Efficiency... Versatility... Flexibility...

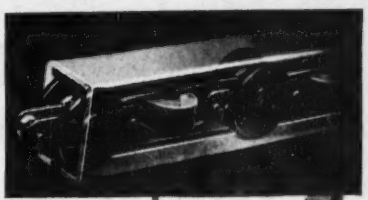
R-W "Zig-Zag®" Continuous Power Conveyors are tops!

ECONOMY—Built-in quality makes Richards-Wilcox ZIG-ZAG Conveyors economical to operate, keeps maintenance costs low, returns investment many times over.

EFFICIENCY—ZIG-ZAG Conveyors keep things moving—reduce handling bottlenecks to a minimum. Carries loads up to 125 lbs. per foot at speeds from 1 inch to 60 feet per minute.

VERSATILITY—ZIG-ZAG is installed overhead, out of the way of production. Six-inch pendant centers make it easily adaptable to a variety of handling jobs. It carries materials up, down, in, out and around, "like water through a pipe."

FLEXIBILITY—When changing production conditions require alteration, ZIG-ZAG Conveyors may be relocated by plant personnel, in many cases using all the parts.



Write for complete details or consult an R-W Engineer at no obligation.

● Zig-Zag Conveyor helps cut sardine cooling time from 12 hours to 25 minutes at McKinley, Maine plant of Wm. Underwood Co. Fish are cooled by forced stream of sea air as conveyor moves "fry baskets" through specially built cooling tunnel.

1880 RICHARDS WILCOX R&W AURORA 1954

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455 W. THIRD STREET, AURORA, ILLINOIS

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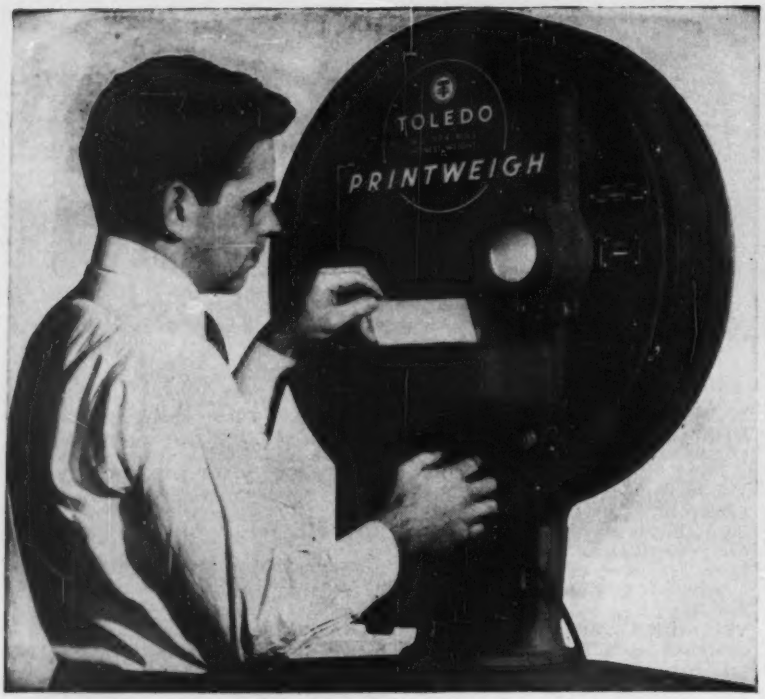

Control Today's Costs PRINT the Weight!

New Toledo Printweigh Scales meet your needs today for *closer cost control!* Stop human errors in reading, remembering, recording . . . provide accurately printed weights with split-second speed . . . accurately recorded!

Printweighs are available for dial type scales in the great new line of Industrial Toledos! *44 new features* include . . . new clean-line design . . . double-pendulum mechanism in one-piece sector . . . lifetime fulcrum. Send for new condensed catalog No. 2001. Toledo Scale Co., Toledo 1, Ohio.

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For practical assistance in the selection of new equipment—for efficient installation—or for dependable, factory-trained service, look to your local Toledo office as headquarters. Phone there for emergency repairs on all makes of scales. Ask about the economy and assurance of Toledo service agreements for regular, periodic inspection—"the ounce of prevention" that guards essential equipment.

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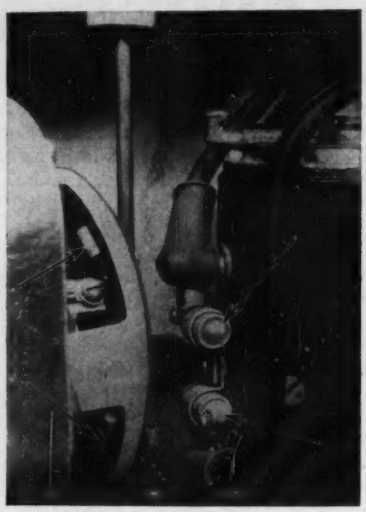

No Radio Interference From This Truck

Electronic interference, the main objection to use of electric fork trucks near radio or other electronic installations is suppressed by these new units.

New development utilizes an electrical circuit incorporating capacitators (see arrows in illustration) to eliminate sparking at electrical contacts, which was found to be cause of trouble. Design was developed at request of government, and tests under actual operating conditions have revealed that machine fully meets requirements for elimination of interference.—*Yale & Towne Manufacturing Co., Philadelphia.*

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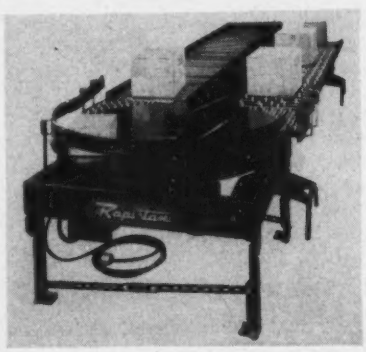

Power Turntable Smoothly Transfers Packages

This new power turntable transfers cartons at 90 or 180 deg. angles between two parallel or right-angle conveyor lines.

New unit, which takes up only 4 ft. of floor space, has a rotating carrier disk that floats packages around inter-

Our Flavors Are Tailor-made and Tested to Insure You a Better Tasting Product

Oftentimes a food, dessert or beverage product requires some special taste or seasoning effect that cannot be achieved through the use of available flavors. In such instances, our laboratories study the manufacturer's requirements and prepare custom-made compounds designed to meet the desired specifications. These materials are then exhaustively tested in our Experimental Food Laboratory (above) where, in laboratory controlled batches, they are incorporated in the actual finished goods. Rigid taste and shelf tests follow. When perfected to our laboratory's satisfaction and submitted for approval, these tailor-made flavoring specialties usually represent a precise fulfillment of the customer's needs. . . . Why not join the many leading manufacturers who have availed themselves this service by consulting FRITZSCHE . . . *A FIRST NAME IN FLAVORS SINCE 1871.*

FRITZSCHE *Established* 1871

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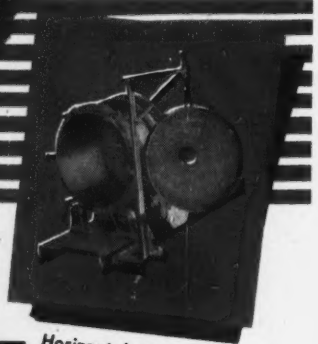
BRANCH OFFICES *and* *STOCKS: *Atlanta, Georgia, Boston, Massachusetts, *Chicago, Illinois, Cincinnati, Ohio, Cleveland, Ohio, *Los Angeles, California, Philadelphia, Pennsylvania, San Francisco, California, St. Louis, Missouri, *Toronto, Canada and *Mexico, D. F. FACTORY: *Clifton, N. J.*

WHEN ROBERT E. PEARY STARTED HIS FIRST POLAR EXPEDITION

Koven

WAS MAKING INDIVIDUALIZED FOOD EQUIPMENT



Horizontal rotary mixer.

Peary's determination to conquer the vast, unexplored Polar regions, won the admiration of adventurous men everywhere. During this period, KOVEN skill and craftsmanship were also winning praise—for the specially designed and expertly fabricated equipment that enabled food manufacturers to achieve more efficient and economical production. Today more than ever, cost-cutting KOVEN units—built to the exact needs of a specific operation—are found in leading food plants where high level production must be maintained. Call or write for a consultation—no obligation.

Send for Bulletin #550.

Complete modern facilities including X-ray inspection and stress relieving which insure quality control. KOVEN equipment in all commercial metals and alloys include: Pressure vessels, extractors, mixers, stills, kettles, tanks, chutes, containers, stacks, breechings. Shop and field erected storage tanks. High vacuum testing.

Fabrication to A.S.M.E. Code Par. U-68 a specialty.

L. O. KOVEN & BRO., INC.
154-D Ogden Ave., Jersey City 7, N. J.

Plants: Jersey City, N. J. • Dover, N. J. • Trenton, N. J.

KOVEN FOR INDIVIDUALIZED EQUIPMENT SINCE 1881

sections. Turntable, a "packaged" production model, handles cartons as large as 22 by 18 in., 24 by 14 in., or 20 by 20 in., and small packages.

Rotating steel turntable is 48 in. in dia. and 3/16 in. thick, supported underneath by four rubber wheels. Turntable is friction-driven by a rubber-faced wheel that contacts inner side of a steel reinforced ring welded to underside of disk. Power is supplied by a ½ hp. motor through a jackshaft to rotate disk approximately 175 rpm.

Packages feeding to and from turntable are kept aligned by wheel feeder sections which steer materials into desired position. This pair of feeders can be placed at any two corners of frame, for 90 or 180 deg. operation. Drive assembly is mounted under table for safety and clean appearance. Table rotates in either direction for two-way operation.—*Rapids-Standard Company, Inc., 342 Rapistan Bldg., Grand Rapids, Mich.*

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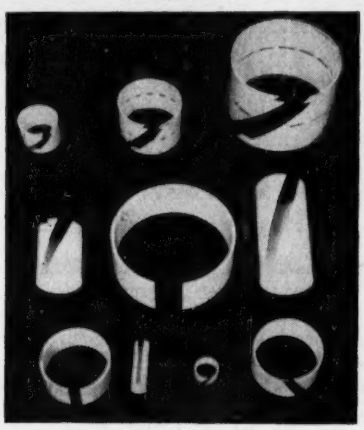

New Bearing Liners Are Made of Nylon

These recently developed bearing liners are made of Nylon. They are used primarily where no lubrication is possible or where increased wear resistance is required.

Liners are offered in two types. Those that are used in standard line of bearings are offered for applications where lubrication is required. The spiral compensation gap, which corrects for the high expansion and contraction of Nylon, is provided with interlocking portions which prevent loss of oil from ends of bearing after it has been circulated through oil distribution slot. A simplified liner, having either a straight or a spiral compensation gap, and without the interlock is also offered.

As these must be designed and built

VOLUME BAG USERS REMEMBER THESE INITIALS

Thomas Phillips—a name well respected in the paper industry since 1882—has recently expanded its bag division and is now able to offer this extra quality product in far greater amounts. Look over the T-P line. Compare service—compare product, and you, like other T-P customers, will find your bag packaging problems eliminated.

TOP QUALITY KRAFT PAPER

For years, several leading bag manufacturers have been using Thomas Phillips' rope composition papers in their product, because certain of their customers, acquainted with T-P quality papers, specified their use by name.

COMPLETE LINE ALL TYPES—ALL SIZES

All Standard types—single wall, duplex and multiwall—in perhaps the most complete line of sizes in the industry, 2 lb. to 100 lb.

MOISTURE RESISTANT POLYETHYLENE

A full line of specials for moisture retention or resistance, including polyethylene coated kraft.

SKID PROOF INKS AND PAPER

Thomas Phillips has developed a texture finish paper that reduces bag slipping to an absolute minimum. Special inks, too, were developed to make bag handling safer, easier.

MIXED CAR SHIPMENTS

Thomas Phillips' full line of sizes and types enables you to get all your requirements from a single source in economical mixed car shipments.

For Your Files:

If you purchase bags you'll want a copy of Bulletin TP-54 for your personal file. It gives a full account of Thomas Phillips' many services, and catalogs this most complete line of finer paper products. Send for yours today!

For 85 years a leading supplier of bags to Agriculture and Industry

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Thomas Phillips COMPANY

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Position.....

Company.....

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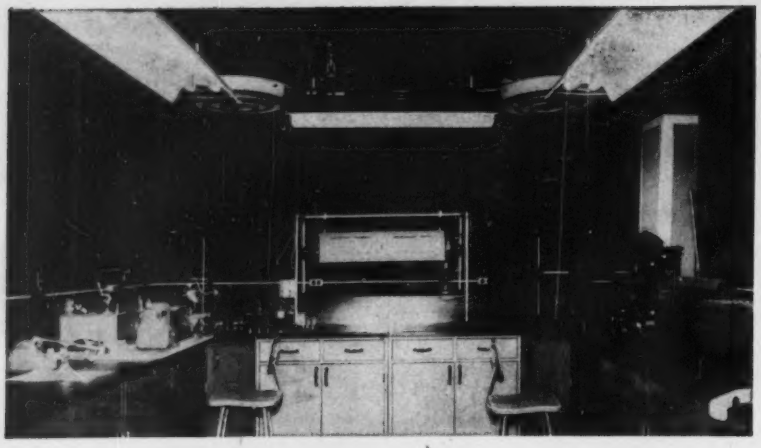

You Can Have DRY Air with EXACT Moisture Control

for your comfort, for your process, for testing machines or materials at any time of the year

Niagara Air Conditioning provides you with any temperature and relative humidity you need, held constant or varied at will. Using "Hygrol" absorbent, you save the refrigeration commonly used to condense moisture and make reheat unnecessary in most cases. It gives large capacity with compact, easily-maintained equipment.

This Niagara Air Conditioning Method dries air directly and measurably, using a moisture-absorbing liquid spray. Humidity control is a separate function from heating or cooling.

This gives you precise control over your air conditions with thermostats alone; no moisture-sensitive devices are needed. You have simpler, more trustworthy, less expensive control instrumentation. Niagara precise-control air conditioning installations have the best record for reliability.

Write for information on the application to your problem. Ask for descriptive Bulletins #112 and #121. Address Dept. FI

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Equipment & Supplies

to the customer's specification, they require a moderate amount of special tooling, and therefore are usually only furnished for moderate or large volume applications where the tool amortization is a negligible factor. For either the standard or simplified liner, housing bore recommendations are furnished to user.—*Thomson Industries, Inc., Manhasset, N. Y.*

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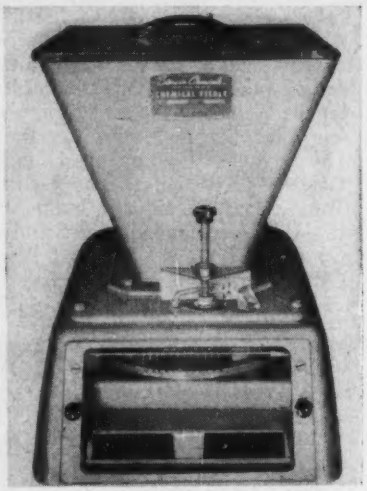

New Dry-Powder Filler Is Highly Accurate

Economy in operating costs is reported with use of a new feeder especially designed to accurately control flow of dry milling powders. Unit is expected to benefit millers, feed, macaroni and other food processors. Feeder is able to handle dry powders of variable densities and flow characteristics. It will feed continuously, and in controlled amounts, such dry materials as vitamin enrichment concentrates, micronutrients, leavening agents.

Another highlight cited for unit is simplicity of operation. Feed rate is obtained by turning a single, precise micrometer adjustment knob. This adjustment of the feeding gate, which is made at start of operations by setting a calibration and gear ratio, provides a constant rate of flow.

Feeder is 27 in. high and requires only 22 in. by 27 in. of floor space. A hopper is equipped with an agitator and a transparent plastic cover. Flow can be observed through a plastic window in front of feeder.

Also available from maker is equipment for overhead suction pipe from feeder to flow agitator.—*Sterwin Chemicals Inc., 1450 Broadway, New York City.*

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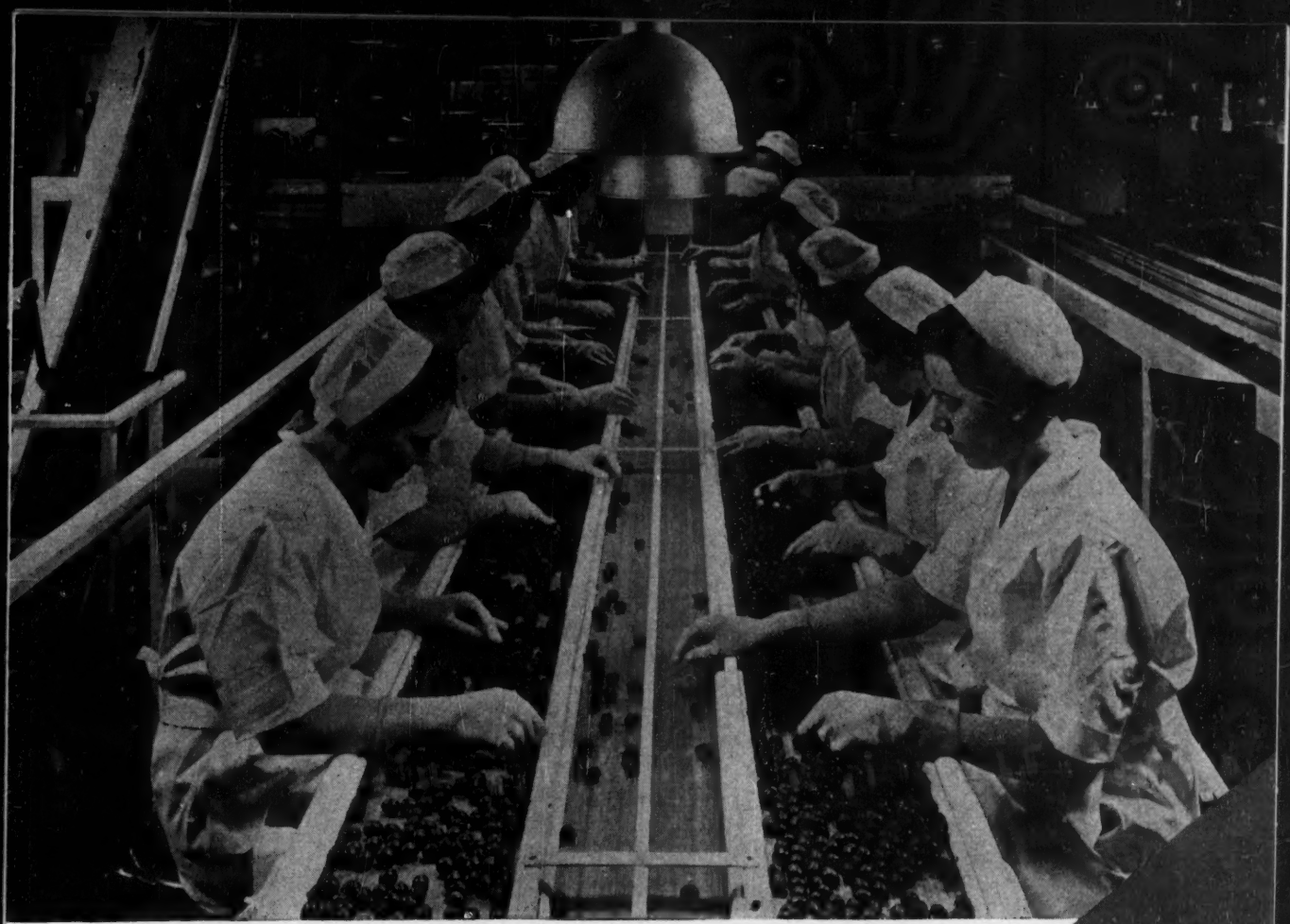
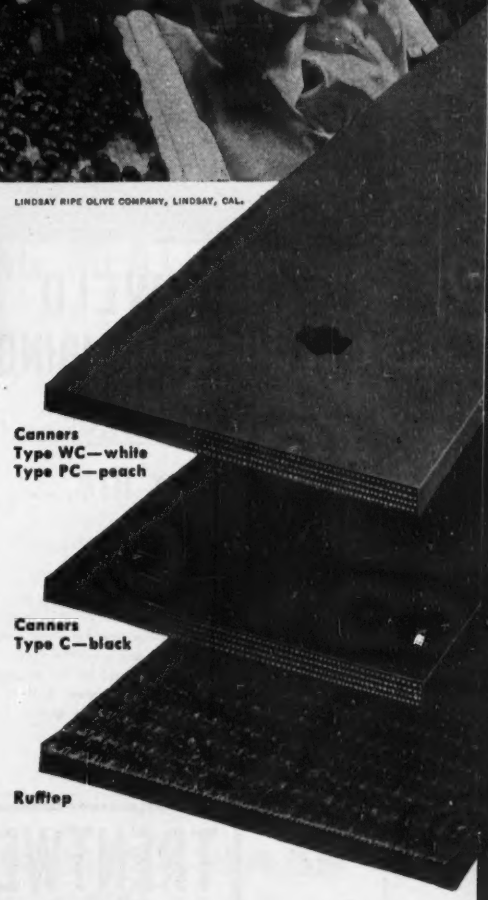


LINDSAY RIPE OLIVE COMPANY, LINDSAY, CAL.

Thermoid Conveyor Belting cuts handling costs on food processing jobs

There's a Thermoid Conveyor Belt designed to lower your costs of handling any food product. Here are 3 examples: *CANNERS (WC & PC)*—For handling vegetables, fruit and other foods. Resists acids. Imparts no taste or odor. Available in white or peach color covers. *CANNERS C*—Ideal for use where food is not in direct contact with belt. For packages, waste and refuse. *RUFFTOP*—Thousands of irregular gripper points guide smooth surfaced articles up inclines to 35°.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life, less down time, lower handling costs. Your Thermoid Distributor can help you select the Conveyor Belt best suited for your requirements. If you prefer, write direct for Catalog 3679.



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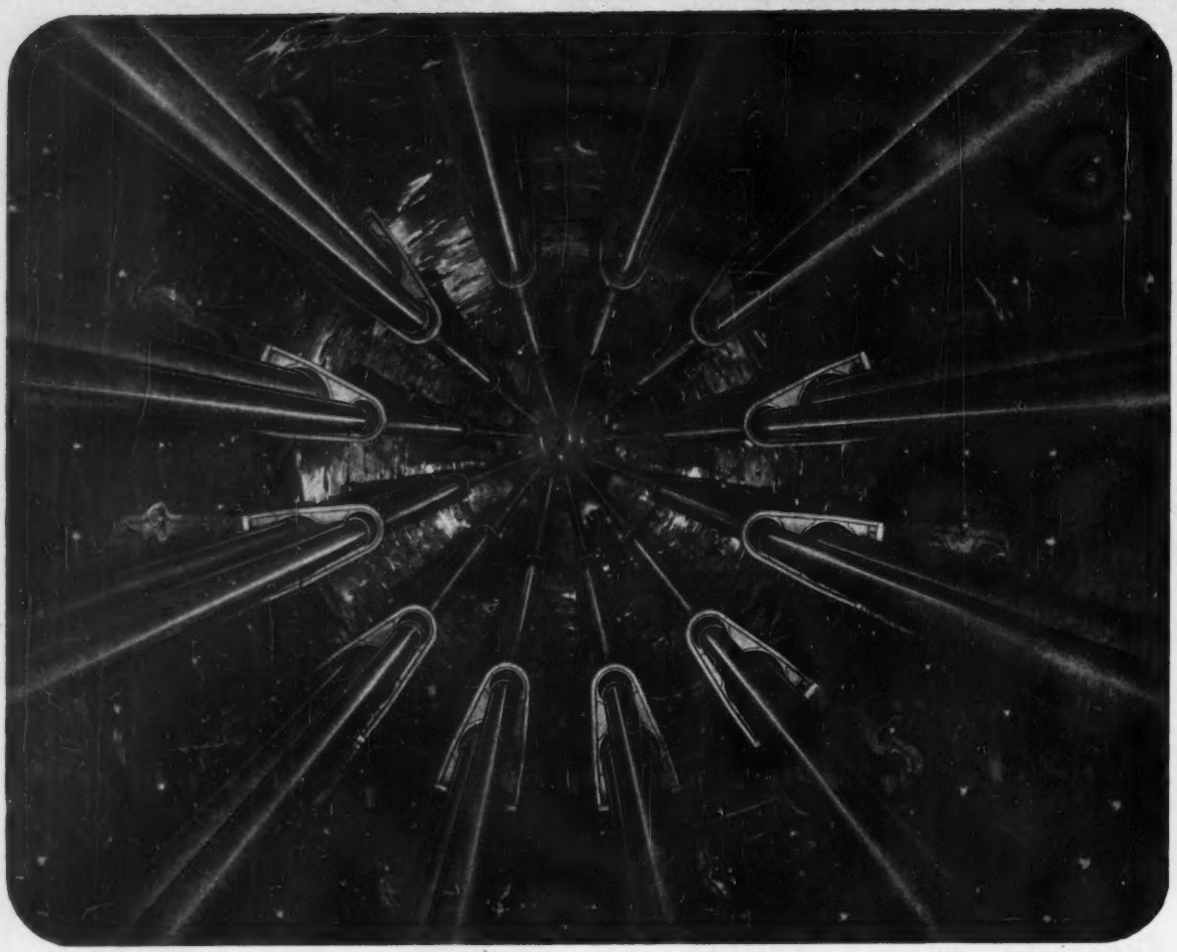
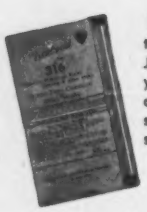


TRENTWELD STAINLESS TUBING gives longer operating life...



FREE—Write for your copy of the new TRENTWELD price calculator. Just a tug at the selector slide gives you complete price information and weight per foot of the tubing size and grade you need. Better send for your free copy now.

TRENTWELD stainless steel tubing gives economical, trouble-free service over long periods of use. It's an ideal choice, for example, for applications such as the 60-foot rotary kiln dryer you are looking into in the photograph above . . . operating at high temperatures and where corrosive conditions are encountered.

In fact, you just can't buy better tubing than TRENTWELD for any application. That's because TRENTWELD stainless and high-alloy *welded* tubing is a product of tube mill specialists. Each tube has a uniformly sound weld indistinguishable from the parent metal and just as strong and corrosion-resistant.

Whether or not your job is as large and complex as a rotary dryer, you can specify TRENTWELD tubing with confidence. And when it comes to tubing sizes and finishes, Trent offers the widest range in the industry . . . from ⅛" to 40" O.D. and up. Next time you have a job involving tubing, remember—you can make it better with TRENTWELD.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

Caustic Soda Additive Ups Washing Efficiency

Improved cleaning and economy in caustic soda bottle washing operations are reported with use of a new additive, called Limelite.

Added to solutions of 2½% or more caustic soda, it brings to bottle washing special lime chelating and lime-sequestering properties which, according to maker converts metallic ions present in hard water into soluble compounds.

Maker points out that material steps up cleaning power of caustic as well as its rinsability. Bottles are free of dulling film. While product was designed specifically for hard water areas, field tests have shown improvement in caustic washing solutions in other areas as well.

Because additive prevents scale formation and steps up rinsing ability of caustic solutions, manufacturers claim that it reduces dragout of solution and caustic consumption. Less scale on machine means less strain on chain and motor, lower power costs, and fewer broken bottles. Material will itself gradually remove light scale already formed on washer.

It is said to be completely soluble in cold or hot water. It is stable in solution, and does not decompose at high temperatures. Effective concentration ratios range from 1 part additive to 10 to 20 parts caustic. It is not necessary to increase concentration when highly caustic solutions (5 or 6%) are used—just the first 3% of caustic need be treated.—*Oakite Products, Inc., 126G Rector St., New York City 6.*

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RHOZYME P-11 MAKES MEAT TENDER WITHOUT MAKING MEAT MUSHY

RHOZYME P-11, a purified food-grade enzyme, is self-limiting in its hydrolytic action upon meats. When formulated and used as a meat tenderizer, it makes meat tender, but not mushy. And it doesn't impart a foreign flavor to the meat.

Produced in this country from domestic materials by Rohm & Haas Company, RHOZYME P-11 has been available at constant activity and consistently low price for eight years. At present, the concentrated, purified enzyme RHOZYME P-11 is priced at $2.50 per pound in drum quantities.

Of course, RHOZYME P-11 is useful for more than meat tenderization. Wherever proteins must be degraded without the formation of undesirable flavors—as in the production of cheese bases from whey protein, for example—RHOZYME P-11 often may be advantageously used.

Why don't you write today for suggested meat tenderizing formulations . . . for a sample . . . for the way to a better product?

Address inquiries to Department SP

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

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CASTERS & WHEELS

REDUCE MATERIALS HANDLING COSTS!

Featuring Darnelloprene treads - a soft, resilient Neoprene rubber compound that has superior qualities in resistance to oils, waxes, most chemicals and oxidation - these casters offer ease of movement, quietness and protection for floors.

BUMPERS AND GLIDES

It will also pay you to look into the many ways that Darnell Rubber Bumpers and Noiseless Glides will increase efficiency and effect savings.

Free DARNELL MANUAL

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Vs. Bungles in Batching

—*Continued from page 89*

is that a variety of flavors are involved and a different color and amount of fruit acid is needed for each flavor.

To avoid errors in the candy room and to retain full control over dosage, the weighing, mixing, and packaging of flavor batches are carried out in a separate laboratory. Then all flavors, colors, and fruit acids are delivered to storage in the flavor room, where rotation of stock is closely supervised.

Where necessary, flavors are blended prior to dispensing. Similarly, colors are mixed from basic certified dyes so that the laboratory retains full control over the final color blends in the candies. Fruit acid, color, and flavor are measured out into conspicuously labeled, aluminum-covered polyethylene containers, each holding the entire color and flavor charge for one candy batch. Containers are stacked on portable 5-shelf racks (each hold one flavor-color mix) and, as needed, are wheeled into the candy room.

This method greatly limits any possible alteration of flavor formula in the candy room. All that is necessary is for the worker to see that the container is properly emptied before being returned to the rack. As an added precaution, empty containers are carefully inspected after each use before being returned to operation. This way there's no chance of a color error —such as a lime-flavored candy that is red.

Vigilant Package Checking

Continuous supervision of packaging operations is an integral part of well-managed production. Painstaking research and development are valueless if this supervision is incompetent or inadequate.

Despite laboratory checks—no matter how frequent—appreciable quantities of sub-standard goods are certain to pass a supervisor who is not alert. For this reason, the competent production supervisor must have much more than a casual knowledge of every phase of the process—and this especially applies to packaging.

Here, it is not only important that defects in the finished wrapper be immediately detected, but also that symptoms of erratic machine behavior be recognized before a major breakdown occurs. Imminence of such breakdowns is ever-present in high-speed packaging machines. Even with new machinery that has been fully broken in, it is at all times necessary to maintain a staff of mechanics on the floor.

At F & F, a large shop, capable of handling almost any type of mechanical job, has been set up at a strategic central location. And for handling minor maintenance tasks, a smaller shop has been set up on the packaging floor. This shop is equipped with lathes, drill press, and subsidiary tools.

The production supervisor thus is in a position to call upon the immediate services of a portion of the shop staff at all times. This is admittedly a costly precaution, but the return in maximum production from the expensive machinery more than compensates for the added expense.

Close Cooperation

As for relations between laboratory and production, both departments at F & F plants have shown a willingness to go more than half way in meeting each other's problems. This is of particular importance in smaller plants, where the establishment of intermediate pilot plants is out of the question.

End (*Resume reading on page 90*)

Recorder Cuts Down-Time

—*Continued from page 65*

reports for work. He starts the machines to be certain that each operates satisfactorily. If one doesn't, he has time to get it fixed before the line has to go into operation.

Even an impending breakdown sometimes is spotted by the production recorder. When a motor starts to misbehave and a burn-out is impending, the recorder pen checking the operation of that motor starts to jiggle. Spotting this, management has the motor reconditioned before it gives up completely and shuts down a line.

Speaking of motors, we triple the lives of these electrical units by baking the windings every six months before the insulation becomes soggy and develops a short-circuit. Although wet conditions necessarily prevail in a meat plant, the company uses totally enclosed motors only in inaccessible locations. Drip-proof motors do very nicely elsewhere—provided they are dried twice a year.

You likely would not guess the identity of one final, and very important, benefit of reducing production down-time. It is better, more uniform product quality. But come to think of it, the smoother the operation the better the results.

So Reliable has profited in many ways from its ingenious, yet rather simple, production line recording system. But it looks for further payoff.

The management plans to study the charts month by month for a year to see if it can't uncover some obscure, but significant, factors. Ten to one it will.

Nor is the company completely satisfied with the recording system, despite its good performance. We plan to supplement the strip-chart recorders with a graphic panel. This will show each production line and each machine in schematic form, and there will be an indicating light at each machine position on the panel. The panel will reveal at a glance what equipment is running, which machines are down. Thus management will be further catalyzed into delay-preventing action.

One trouble with the recorder is that the slowly moving strip chart takes 20 min. to travel to the front side of the roll where the lines and their telltale breaks are easily visible. The lights will compensate for this shortcoming.

Down to Details

By now you perhaps are a bit curious as to what makes this handy new management tool tick. We mentioned that it is rather simple. The "eye" of the system is an Esterline-Angus service recorder with 20 electrically actuated inking pens which draw parallel lines on a strip of paper 4¾ in. wide. This paper is graduated into hours, and each hour into 2-min. intervals. And the pen positions are numbered on the paper from 1 to 20 to identify each operation being charted.

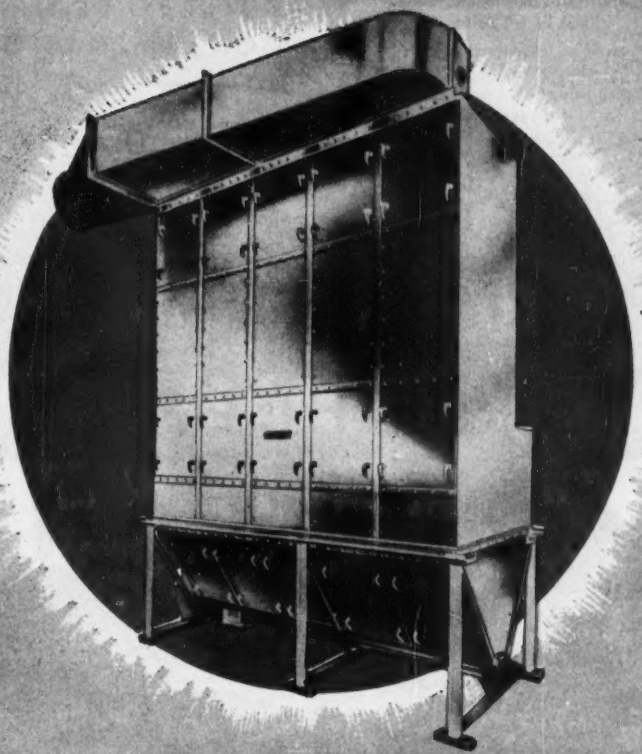
When a machine shuts down, the corresponding pen moves sidewise ⅜ in. It continues to draw its line in the new position until the machine starts again, then the pen flips back to the main line. So an instant's stop gives a sidewise jiggle in the chart line. A longer stop puts a "hump" in it.

These jiggles and humps tell the down-time story when the chart is analyzed. The length of each hump, measured by cross lines on the paper, indicates just how long a machine was stopped. Its position tells the time of the delay. The roll that moves the strip of paper is driven, of course, by an accurate electric clock mechanism.

Each pen is actuated by an electromagnet. And the electrical coil of this magnet is connected into a 24 v. circuit. This circuit gets its power from the low-voltage winding of a small transformer, the high-voltage winding of which is connected across the circuit of the motor driving the machine whose down-time is being recorded.

When there is power on the motor, there is voltage in the recorder electro-

THE SIMON SUCTION FILTER DUST COLLECTOR IS BETTER THAN EVER!!!



Re-designed and streamlined...to keep in step with modern milling practice! Each section now contains 190 square feet of filter surface in place of 127 square feet . . . yet occupies the same amount of floor space. In addition to its streamlined efficiency, the Simon Suction Filter Dust Collector still contains *all* the outstanding features which have made it a leader in its field . . .

COST ...per sq. ft. of filter area is lower.

UNIFORM AIR FLOW ...each filter sleeve group is automatically cleaned.

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*SAY "SEE-AR-CO"
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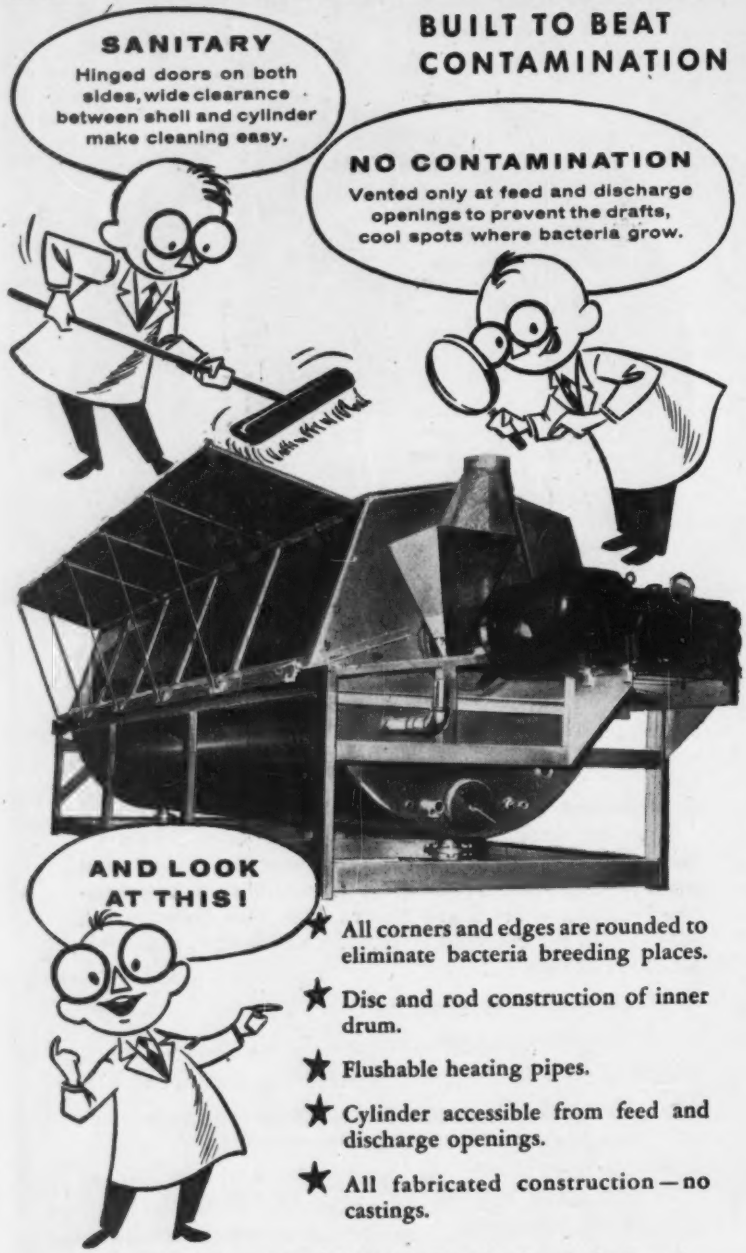
SANITARY
Hinged doors on both sides, wide clearance between shell and cylinder make cleaning easy.
NO CONTAMINATION
Vented only at feed and discharge openings to prevent the drafts, cool spots where bacteria grow.
AND LOOK AT THIS!

★ All corners and edges are rounded to eliminate bacteria breeding places.
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The Feature Finders are right! CRCO's new Blancher doesn't give bacteria the time, temperature or place to grow. Write for complete data.

THE BEST OF Everything FOR THE FOOD PROCESSOR
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magnet, and it holds the pen in the "operating" position. When the motor is stopped, there is no magnetic force at the pen, and a spring flips it sidewise to draw the production-break line.

When the indicating lights are installed on the proposed graphic panel, these also will be connected into the pen electromagnet circuits.

The strip chart, incidentally, is one month long, avoiding frequent reloading of the recorder. And each day a 24-hr. strip is cut off for analysis and for filing.

We mentioned that 20 operations were watched by the down-time recorder. These operations are in the following departments: Killing (or hog dressing), hog cutting, rendering (both edible and inedible), and the feed mill.

And you may be surprised to learn that one pen operates when the back door to the plant is opened to permit a truck to pass through. The purpose is not to keep track of truck movements. Instead, the idea is to see that this door is closed to avoid pilferage. Two other outside doors will be connected to the recorder in the future.

End *(Resume reading on page 66)*

Automatic Handling

—Continued from page 94

of product is identified by a short stripe printed at a specific distance from the end of the carton at the same time the cartons are printed. The inked stripe absorbs light, thus causing a drop in reflectance as the stripe goes past a light beam.

As the carton, moving at a regulated speed, approaches the electric eye, it trips a microswitch, causing the eye to begin a scanning cycle. Each of the six eyes is set to respond to a different time interval at which the density of reflected light will drop.

If the light density does drop within the eye's sensitive interval, the eye actuates a switching device that shunts the carton from the main line onto a spur line. If the mark on the carton doesn't correspond to the setting of the first eye, the carton passes successively to the other electric eyes until the correct match is made. This novel sorting system, designed by Lamson in cooperation with Lever Brothers engineers, uses commercially available components.

Occasionally, because of variations in the reflectance of the carton surface or other factors, a carton will pass the proper switch-off point. The carton then ends up on a dead-end conveyor, where it is recovered at a later time. This dead-end conveyor also provides

an alternative method of unloading the cartons by hand whenever it is necessary.

Switching Device

Each switching device, which transfers the carton from the main line to a spur line, consists of a short conveyor, with five closely-spaced V-belts. These belts are installed between the main conveyor rolls, crosswise to the direction of travel of the main conveyor. Normally, the switching belts are below the tops of the conveyor rolls, so that the carton can pass over them without interference.

When the controlling electric eye is triggered, the set of belts is raised under the oncoming carton by an air cylinder. So the V-belts move the carton laterally and deposit it on the adjoining spur line. Then the switching belts retract before the next carton approaches. One set of belts is associated with each of the six spur lines.

Loading of approximately 60 cases per minute on a pallet is now accomplished with a fully automatic palletizer (Lamson Corp.). Stacked into one side of this machine by fork-lift truck are a dozen pallets. Into top of unit go the full cases from one of the six accumulator lanes.

At the press of a button, the machine takes over and stacks, on each pallet, layers of cases in interlocking arrangement of alternating patterns.

A simple arrangement of a pair of electric eyes along one side of the powered roller conveyor taking pallet loads away from the palletizer provides the flexibility of permitting flow either to the floor below by the Lowerator (elevator) or onto the same floor by fork-lift truck.

Second-floor storage of a pallet load is accomplished as the truck breaks the "eye" beam thus automatically stopping the conveyor. Truck then simply lifts pallet load from conveyor and transports it to place of storage.

From roller conveyor, pallet load of cases goes onto car of the fully automatic elevator. Load then descends to floor below, where it is discharged onto a gravity roller conveyor. Here, it is finally picked up by fork-lift trucks for storage or shipment.

Eliminated through use of this automatic elevator are up-and-down floor movements of lift trucks.

Special service to local dealers is speeded by a selector conveyor system installed near the 1st-floor truck-loading bays. Here, a complete assortment of products is stored adjacent to the convevor, permitting warehouse personnel to fill small orders for a variety of products. The mixed shipment is then loaded directly into trucks.

End (*Resume reading on page 94*)

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No sharp edges to the wire! No blade-like construction members! And, the mesh can be woven closely enough so that it won't catch . . . and cut . . . operators' fingers on inspection, sorting or packing tables.

That's just one reason why WIRE MESH conveyor belts are superior to other types of open mesh metal belting for food processing. Open mesh of the belt allows free drainage of wash water or process solutions, free circulation of heat or cold for cooking or cooling. All metal belt has no odors, cannot contaminate natural flavor or aroma of your product. Metal construction also gives long life, permits easy cleaning with steam or water. Stainless steel, widely used for food processing belts, assures further freedom from contamination by giving lifelong rust protection.

No matter how you look at it the best all-around conveyor belting for food processing is WIRE MESH . . . and the best wire mesh belts are made by Cambridge, pioneers in wire mesh belt fabrication. Cambridge belts are made in any size, mesh or weave, and from any metal or alloy. Your Cambridge Field Engineer can recommend the best type for your plant. Look under "Belting-Mechanical" in your classified telephone book or write direct for the Cambridge man nearest you.

FREE CATALOG gives conveyor and belt design and application in all types of food plants. Write for your copy today.

DOUGHNUTS RIDE through a deep-fry unit on this Cambridge wire mesh belt. Moving belt gives continuous and uniform processing without manual handling. Open mesh permits free drainage of hot cooking oil.

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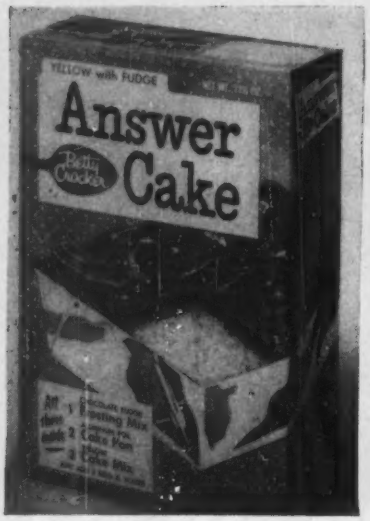
NEW PACKAGES & PRODUCTS

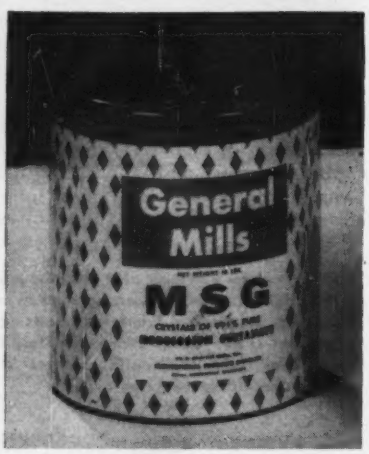


More Cake, Frosting Mixes for Miller's Line

An instant frosting and an "Answer Cake" have been added to General Mills line of Betty Crocker ready-mixes. The frosting is being processed in three flavors: chocolate fudge, chocolate malt, and peanut creme. The 15-oz. package identifies flavor by the color of the icing in a bowl featured on the front and side panel. The mix is made with an exclusive pre-cooked sugar process.

The Answer Cake holds the answer to the housewife's demand for a convenient mix for a small cake. The carton holds a package of cake mix in four flavors, a package of chocolate or peanut creme frosting mix and an aluminum foil baking pan which does not require greasing or flouring. A six to eight piece white, yellow, devils food, or peanut delight cake can be made with the addition of an egg and water to the cake mix, and water to the frosting mix. A feature of the carton is the perforated top which is easily opened with one finger.

General Mills line of institutional products are now sporting a red diamond pattern on a white background. Among the products to bear the new trademark are nine different cake mixes, two roll and pastry mixes, a pie crust mix, cereals, and MSG.



Frozen French Toast

Humpty Dumpties French Toast is making its first appearance in frozen food cabinets throughout the U. S. Each carton contains four slices of toast. Reverse side of the four-color waxed overwrap features recipes. Product marketed by French Toast Corp. of America, Red Hook, N. Y. Overwraps by Western Paper Division, Crown Zellerbach Corp.

Unique Spice Kits

Directed at the Christmas gift trade are a quartet of attractive herb and spice packages packaged by John Wagner & Sons, famous Philadelphia spice dealers. Both spice and herb kits are made in two sizes. The Herb Blend Sampler contains mixtures for use on salads, meat, fish, and poultry. The Seasoning Sampler contains hickory smoke salt, charcoal salt, garlic salt, and a taste enhancer. The Fine Herb Sampler includes portions of eight popular herbs. The Special Variety Sampler holds Lampong pepper, cinnamon, onion powder, curry powder, paprika, Hickory smoke salt, oregano, and herb blend for salads.

The herbs and spices are contained in styrene vials with tightfitting plastic caps. The carton is gold, with fine script lettering and a sketch of seasoning applications.

Expandable Tea Bag

Expandable teabags are the latest step toward a bigger and better teatime. White Rose tea bags now feature the patented expansion bottom design. Expanding with the swelling of the tea, the bag offers more brewing surface at the bottom of the bag. Called Full-Brew, it will replace the company's standard tea bag.

New Whipping Agent

Known as Peebles Dairy-Whip, an improved whipping agent has been developed by Western Condensing Co., Appleton, Wis. Performing like egg whites by costing far less, the product is made from sweet dried whey and is available in powdered form.

Providing a smooth, creamy body, the agent reduces weep in the finished product and improved keeping quality.

The unique whipping properties stem from high concentrations of lactalbumin protein, plus milk salts which promote greater stability. The

Riegel Pouchpak* withstands 10" VACUUM TEST

Government cocoa beverage powder requires a strong, vapor-tight package that withstands a 10" vacuum under water. Though the pouch bulges like a pillow, there must be no tell-tale air bubbles, no burst seams. Riegel's Pouchpak, a triple lamination of pouch paper, foil and polyethylene, easily exceeds these specifications.

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In answer to increased interest in a recently inaugurated procedure for conducting "on-the-spot" demonstrations of air-flotation equipment, we are pleased to make the following explanation.

The advent of our lab-size Whippet V-80 Separator makes it possible to establish, in your own plant and at your convenience, accurate forecasts of results which will be obtained from the identical process under full-scale operating conditions.

Such a demonstration may be of invaluable aid to that phase of your research program which involves the economy of operations and the quality of raw or end products. Perhaps the V-80 will indicate an immediate usefulness. Seeing is believing.

Your move is simple. Write to the department and address below. Tell us that you want to see the results of separations made by effecting differences in specific gravity through air-flotation . . . under *your* actual operating conditions, rather than in a catalog. We'll take it from there.

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1031 SOUTH HASKELL, DALLAS, TEXAS

product also contains lactose, enhancing natural flavors and particularly advantageous where delicate, volatile flavors are used. (160A)

Pizza Pie Plates

Foil platters for pizza pies are processed by Ekco Products Co., Chicago. The processor may freeze ingredients in the 9-in. wide pans, letting the consumer bake and serve the product in the foil pan.

The foil will not absorb food oils or impart off flavor, and so may be re-used by the housewife.

The pan is available in two styles: one with a curles rim to eliminate danger of cutting fingers, and a special model with a vertical flange that provides a firm seat for a closure cover. The name of the processor may be embossed or debossed in pan bottom. Each pan holds 22 fl. oz. (162A)

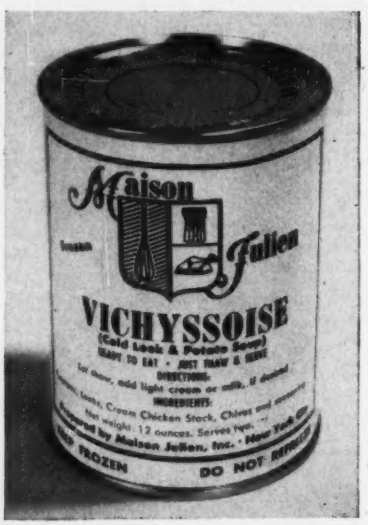
Quadruple Can Tray

Designed to meet the requirements of Minute Maid Corp.'s "buy three—get one free" campaign, is a paperboard tray manufactured by Alford Cartons, Ridgefield, N. J. Using the trade name Rigid-Pak, the trays hold four cans of frozen lemonade and limeade.

Manufactured on an Alford machine at speeds of up to 90 per minute, the trays are perfect for sliding into ice-cube tray compartments. No glue is used in the carton to prevent package deterioration, and it may be shipped flat to save storage space. No overwrap is used, the tray reported capable of holding the cans even when held upside down. (162B)

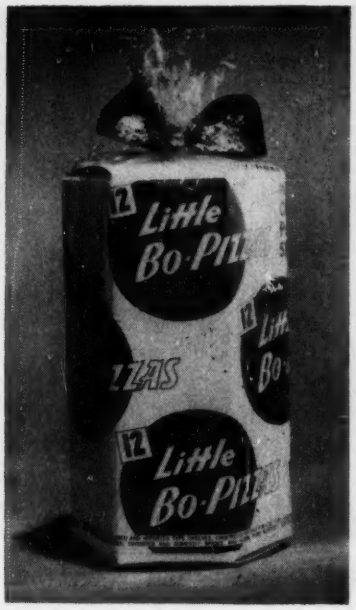
Twin Pie Pack

Added to Swanson's quick frozen line are these Twin-Packs for fruit pies. Two complete pies are packed in each colorful carton. Printed in six colors, the overwraps offer reproductions of the cherry and apple pies as they are served. Cartons are by Marathon Corp. (162C)



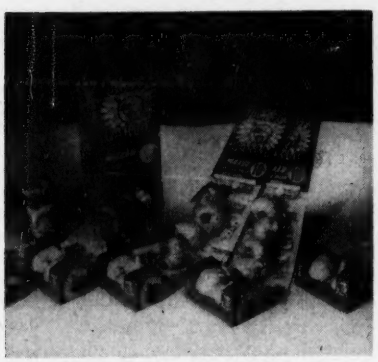
Soup Below Zero

Ready to thaw and serve is Maison Julien, Inc.'s frozen vichyssoise soup. Made of potatoes, leeks, cream chicken stock, chives, and seasoning, the soup is packed in a 12-oz. can. Each can contains enough for two portions. The product requires no preparation beyond thaw, except that light cream or milk may be added if desired.



Pint-sized Pizzas

Miniature Italian pizzas are being processed by Puritan Frosted Foods Corp., under the trade name, Little Bo-Pizzas. About three inches in diameter, the appetizers contain the same ingredients as a standard size cheese pizza. The product requires only eight minutes heating before serving. Twelve are packed to each package.

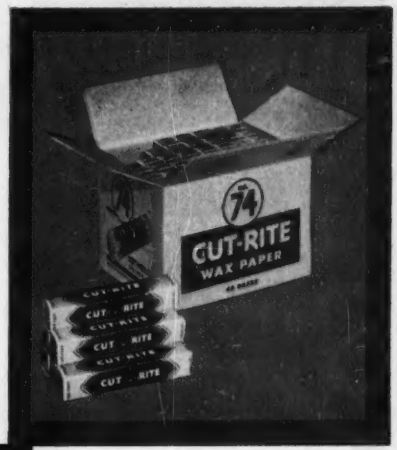


Odorless Garlic Debuts

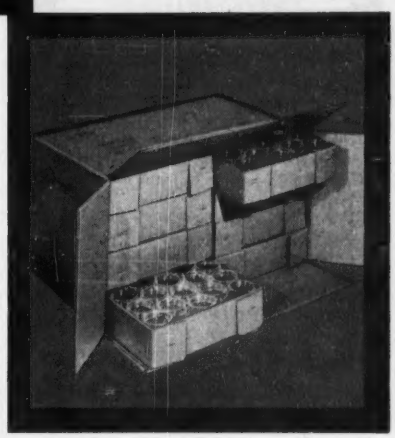
Preservation of flavor and sealing in of odor is the feature of the new No-Dri garlic marketed by Tulkoff's Hot Horseradish Products Co., Baltimore. Waxed upon arrival from Italy, the product is marketed in window-type boxes holding two bulbs, and cellophane bags holding one bulb. For bulk shipments, the garlic may be packed in knitted or pliofilm bags, or in wooden crates.

Tulkoff's also processes a line of white and red horseradish, and cocktail sauce. (163A)

STURDY
CONSTRUCTION



ECONOMICAL
SHIPPING



POSITIVE
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Write for free booklet, "How To Stack & Load Corrugated Shipping Boxes." Hinde & Dauch, Sandusky 11, Ohio.

HINDE & DAUCH
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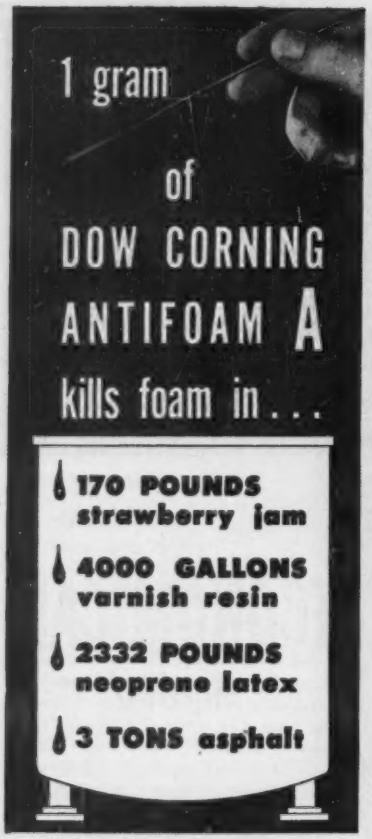

Effective at very low concentrations, Dow Corning Antifoam A Compound is the most economical, the most efficient and the most versatile foam-killer ever developed. Odorless and tasteless, this silicone defoamer is physiologically harmless in foods at concentrations up to 10 parts per million. Thousands of chemical and food processing plants depend on Dow Corning Antifoam A to cut processing time, to save productive capacity now wasted on foam, and to eliminate wasteful and hazardous overflow.

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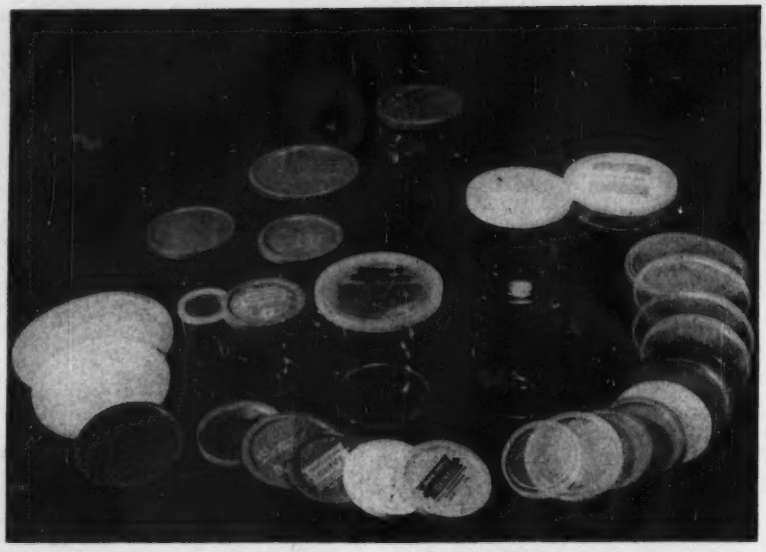


Styrene Containers Sport Poly Caps

A complete line of polystyrene containers with printed polyethylene lids is offered by Buckeye Molding Co., Miamisburg, O., under the brand name of Flexeel.

Ranging in size from 1½-oz. to 18-oz., the plastic containers are available in a wide variety of shapes. Ideal for packaging such items as cheese spreads, salads, peanut butter, honey, ice cream, meat spreads, and sausage, the containers spark eye appeal with a full view of the product and also have a re-use attraction directed at the housewife.

An exclusive patented feature of the polyethylene lids is the snap-on, liquid-tight, self-sealing closure, made possible by a lip on the inside rim of the cap. Using this lid, the product may be resealed after each opening. The tight seal insures product protection and will prevent odor leakage.

The processors label or sales message can be printed on the lids, available in all colors. A label may be applied to either the cover or the container by either adhesive thermoplastic label, or pressure sensitive label.

The polyethylene lids are used for glass juice decanters, just as they may be used for cans or glass jars. (164A)

Juice in Cartons

Fresh Florida orange juice is being marketed by Borden's, Newark, N. J., in waxed paper containers. Using the Orange Blossom label, the dairy is packing the juice in American Can Co. cartons that closely resemble the suppliers milk cartons.

Free of any additives and not a concentrate, the juice is processed by Florida Juice, Inc., Miami, and shipped to the Newark dairy in 3,750-gal. tank trucks. A unique shell of stainless steel surrounded by plastic-impregnated balsa wood protects the juice during the 1,400-mile trip.

New Look for Cereals

A brighter package and increased appetite appeal is the objective of General Foods' new design for their Post cereals. Reproductions of the

prepared cereals will be featured on the front panels of the packages, without decrease of identification.

First of the cereals to sport the new look will be Post's Sugar Crisps, 40% Bran Flakes and Grape-Nuts Flakes. The rest of the Post line will follow suit in the next few months. The packages will feature the product name in a baloon on the upper left of the front panel. Over the product name a red oval holds the Post logotype. Retaining red and blue lettering on a blue background, the new family of packages will also use other colors to advantage.

There are no planned changes in product or the package make-up.

Frozen Mexican Dinner

A frozen Mexican-style dinner is now on the Texas market, processed by Circle T Meat Co., Dallas. Offering three favorites—enchiladas, refried beans and rice with hot sauce—the dinner is packed in a foil plate, in an attractive carton which plays up the Mexican motif.

Precooked, the dinner need only be heated and then served. The sauce is contained in a separate aluminum cup in the center of the plate, with the enchiladas, beans and rice attractively arranged around the edges.

The dinner is frozen via a 90-min. blast-freezing process which seals in flavor and insures long preservation.

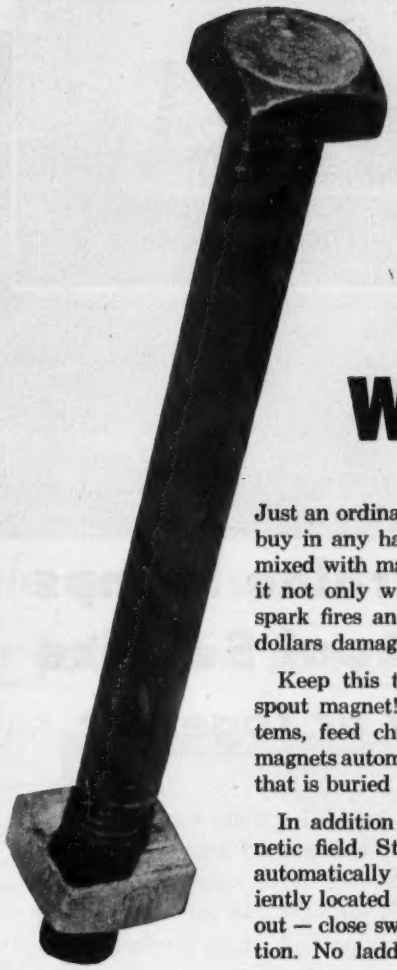
New Product Shorts

Frozen Line for Meat Packer

Wilson & Co., Inc. has introduced a line of frozen products including beef pies, swiss steak with gravy, Salisbury steak with gravy, and turkey pie. They will be marketed under Jane Wilson brand name.

Institutional Instant

Instant coffee in both liquid and powdered form is being processed by Coffee Instants, Inc., New York. The products will be for the institutional trade.



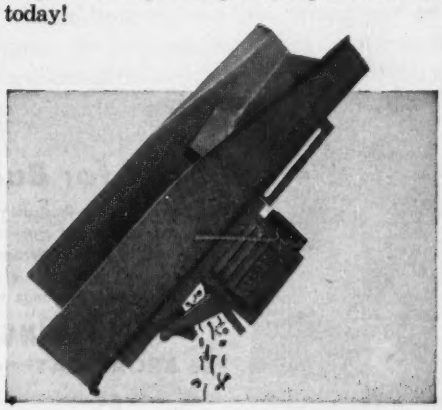
6-inch Plant Wrecker

Just an ordinary, harmless bolt, the kind you can buy in any hardware store for a few cents. But, mixed with materials going through a pulverizer, it not only wrecks costly equipment, but can spark fires and explosions causing thousands of dollars damage.

Keep this troublemaker out with a Stearns spout magnet! Easily installed in conveyor systems, feed chutes, etc., powerful Stearns spout magnets automatically trap and remove tramp iron that is buried in bulk materials entering the plant.

In addition to providing a strong, deep magnetic field, Stearns electro spout magnets are automatically cleaned. Simply open the conveniently located control switch and tramp iron drops out — close switch and magnet is again in operation. No ladders to climb — no hand cleaning.

Reduce explosion, fire and equipment damage, cut insurance rates with a Stearns electro or permanent spout magnet. A postcard request for Stearns Bulletins 92F and 97E is a positive step to plant safety and product purification. Do it today! 1058



Stearns AAA spout magnet discharging tramp iron.

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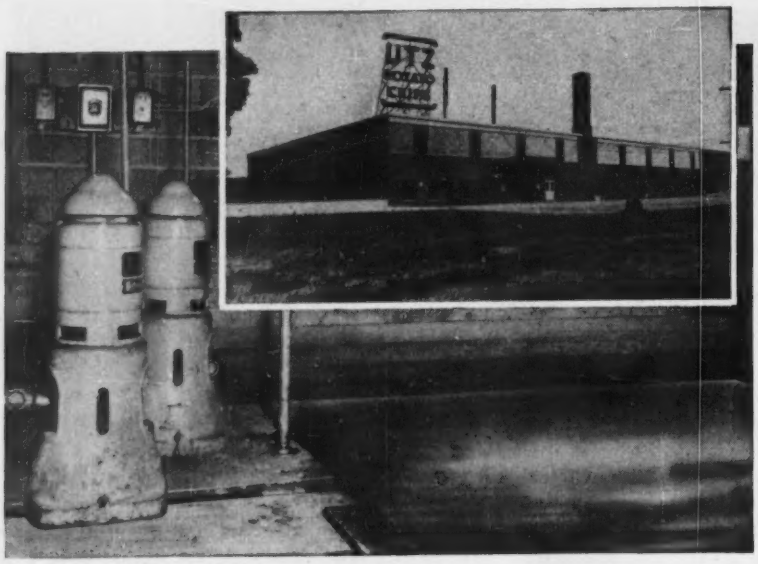


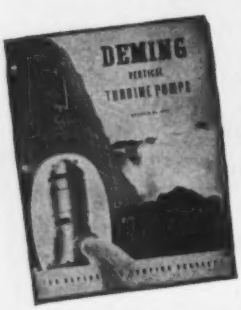
Deming Turbine Pumps Perform Dual Service

Separately or Together

Pure spring water is used in processing those tasty chips produced by the Utz Potato Chip Company, Hanover, Pa. Purity of the water supply is evidenced by its acceptance by the Pennsylvania State Health Department. The same cool spring water is used for air conditioning units in the modern plant.

Purity of the water is protected with two Deming Vertical Turbine Pumps. Those water-lubricated units assure that the water supply will not be contaminated by oil or grease as none is used.

The two pumps can be operated as one unit, or separately, as required, for processing and air conditioning service. This is another example of the adaptability of Deming Vertical Turbine Pumps for a wide variety of applications.



Send for Bulletin 4700

This 24-page, fully illustrated bulletin explains the construction features and many of the more widely used applications of Deming Vertical Turbine Pumps. Unit drive heads are built in a range of sizes with motors from 1 to 250 H.P. Capacities range to more than 3,500 G.P.M.

THE DEMING COMPANY
556 BROADWAY • SALEM, OHIO

DEMING PUMPS

Quadruple Uncaser Benefits

—*Continued from page 70*

tween them), it touches an overhead wheel that activates an electric switch, automatically stopping the machine.

Inside the unit, the case is caught from behind by a flight bar and from the sides by two flap hold-downs, all mounted on an endless chain. So held, it is inverted between a spring tension belt and four 2-in. rubber belts.

How Wheels Transfer Bottles

The two center belts lower the center rows of bottles into the first of two transfer wheels, which rotate in the same direction as the belts and at the same speed. Each of these transfer units consists of two outer wheels of pliable rubber and an inner wheel of rubber-encased steel. The housing on the downward arc is lined with sponge rubber, which presses the bottle, through the pliable rubber wheel, against the rigid inner wheel.

As the wheel turns, the bottles are inverted. At the bottom of the arc, the rubber wheel is pressed back by two steel fingers and the bottle set free. A tension belt holds back half-a-dozen bottles at a time for release to the conveyor and dispersing mechanism feeding the two soaker-loaders.

Unless diverted by a bar to the first soaker, the bottles continue on to the second soaker, until the supply backs up to the first. From the conveyor, the bottles are spread out, on the loading table, to full width of the soaker. They are arranged in full channels between oscillating alignment guides, and they move into a tilt table that automatically loads them into the soaker-washer unit.

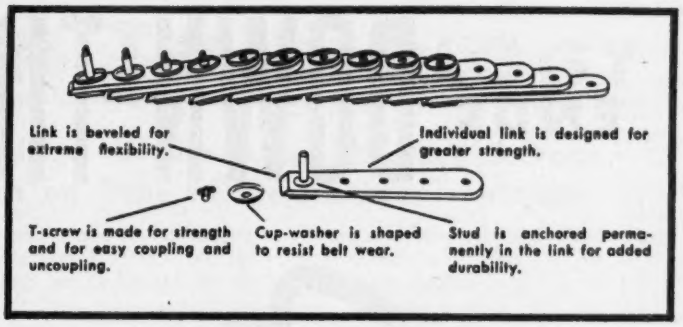
Debris Dropped, Collected

Meanwhile, on the uncaser, the outer rows of bottles are delivered to the second transfer wheel in the same manner as the inner rows. The case remains inverted long enough for debris to fall out into a built-in trash bin, after which the flight bar and flap hold-downs drop away on the chain over the end of the conveyor, to begin the cycle anew.

The case then is inclined slightly, between tension rollers, until inverted between two spring-tension belts and a rotating overhead drum. The inverted case then goes on an overhead conveyor, moving at 110 fpm. and is carried to an upper floor. Here, dividers are taken out, good cases are set aside for re-use, and the "foreign" or damaged cases are baled for shipment to a fiberboard company.

End (*Resume reading on page 71*)

This detailed line drawing of the new Veelos TD and TE v-belt makes it easy to see how this new v-belt is designed to do a better job... easier!


Link is beveled for extreme flexibility.
Individual link is designed for greater strength.
T-screw is made for strength and for easy coupling and uncoupling.
Cup-washer is shaped to resist belt wear.
Stud is anchored permanently in the link for added durability.

New VEELOS

TD and TE Adjustable V-Belt for D and E drives

▶ *easy* to couple and install

▶ does a *better* job for a *longer* time

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New Veelos TD and TE v-belt is faster and *easier* to install. Cup-washers and T-screws join links together to make up individual belts—and you don't need to remove outboard bearings.

New Veelos TD and TE v-belt lasts longer. Advanced construction of stud, cup-washer and T-screw provides added strength and durability—protects the new high-tensile strength link.

New Veelos TD and TE v-belt is perfectly balanced. Machine-cut sides and uniform links provide smooth, vibrationless, full-power delivery.

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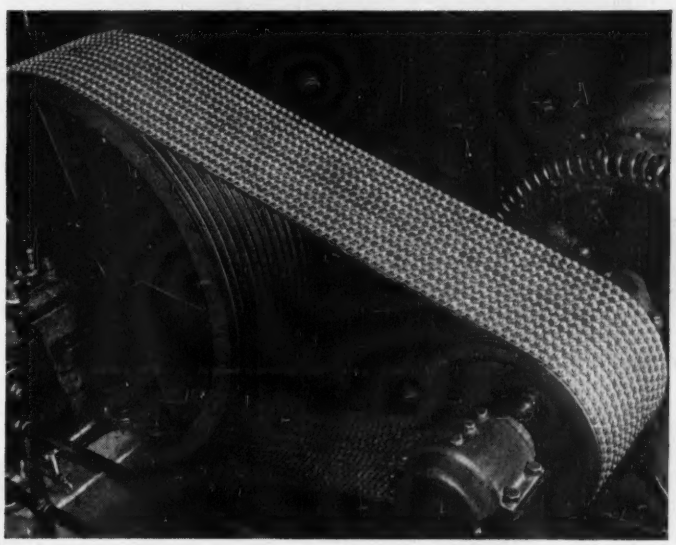
Get the complete story of this great, new v-belt. Send coupon for new 8-page illustrated bulletin.



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Gassing Aids Turkey Kill

Immobilizing turkeys, by gassing with CO_2 before they enter processing line, minimizes carcasses downgraded due to bruises, broken bones, etc., resulting from struggling during shackling, sticking, and bleeding.

Technique applied follows principle of hog-immobilization developed by Geo. A. Hormel & Co. It was this process that won the 1953 biennial Food Engineering Award as the outstanding current achievement in food technology (FE June '53, p. 43).

Best results are obtained with birds in upright position and using 73-77% concentrations of CO_2. Times of exposure vary with weight, variety, and sexes—*Marketing Activities*, (USDA Agr. Marketing Service, Wash., 25), 10-12, Nov. 1954.

Longer Lived Candies

Addition of 3% oat flour or debittered brewer's yeast—both known to contain antioxidants—to butter for use in candies extends their shelf lives 2-6 times without imparting detectable flavors.

In case of fudge and butter creams made with yeast-containing butter, the candies stood up 16-19 weeks at 86 F. whereas unprotected products were rancid in 2-3 weeks.

Shelf life of butter mints was extended from 8-9 weeks to 16-19 with either yeast or oat flour addition.—*Agricultural Research*, 14, Nov. 1954.

Bacteria in Chicken Salad

Cooked and boned chicken to be used in salad should be refrigerated at once at 45 F. or lower to prevent growth of food poisoning organisms. For *Micrococcus pyogenes* var. aureus grows readily in the diced product at 70-80 F.

When made into salad with a pH of 5.5-5.7 growth of these organisms is retarded. However, it is recommended that the salad be refrigerated in a manner similar to the diced meat—*Food Research*, 465-71, Sept.-Oct. 1954.

Antibiotics vs. Organisms

That sporeforming organisms involved in spoilage of canned foods cannot be eliminated by use of antibiotics, is indicated by recent tests in which 9 antibiotics were screened against 5 sporeformers.

Antibiotics tried were: Neomycin; celiomycin; streptin; circulin (Q-19); M-2517-6 (911-A); M-51R4076 (A-20); M-3461-A (HE-833-A); M-3385 (HE-922-A), and M-3478-3 (HE-900-A). Spoilage organisms used were: *B. thermoacidurans*; *B. stearothermophilus*; *Cl. botulinum*; *Cl. sporogenes*; *Cl. thermosaccharolyticum*.

Under conditions of the test, antibiotics were sporocidal against some of the organisms, but none was effective against *Cl. botulinum* or *Cl. sporogenes*—*Food Research*, 483-87, Sept.-Oct. 1954.

Better Dry Mashed Spuds

Rapid conversion to mashed potatoes with texture and color of good, freshly prepared ones by whipping with hot water or milk are advantages claimed for a newly developed product "potato flakes."

Flakes are prepared by drying cooked, mashed potatoes on a steam-heated, double-drum dryer. Temperature of milk or water used to reconstitute are said to be unimportant.—Circular ARS-73-2, Eastern Utilization Research Branch, USDA, Philadelphia 18, Pa.

Composition of Rice After Extended Storage Depends on Type of Pre-Storage Treatment

A thiamine content of 1.8 mcg./g. was recommended in 1948 as a minimum standard for milled rice by the F.A.O. Nutrition Committee for South and East Asia. To obtain this thiamine content undermilling is necessary, and such rice can undergo serious quality deterioration under the poor storage conditions.

Trials on husked rice, raw undermilled rice, parboiled undermilled rice, and raw milled rice showed, over a year's storage, that the alpha-amylase activity decreased from 130.7 to 10.4 mg. of maltose produced per g.

Cooking quality, measured by volume increase, improved, greatest in raw milled rice, least in husked rice. Nitrogen content remained constant throughout though there was a decrease in percentage of salt-soluble nitrogen, indicating some protein denaturation.

Thiamine levels fell off slowly in all unboiled rices, from 3.3 to 2.6 mcg./g. for husked rice, 1.8 to 1.4 mcg. for undermilled, 1.1 to 0.8 mcg./g. for milled.

In the case of parboiled unmilled rice (cooked 2 hr. at 177 F., followed by drying and milling) the loss was less, 2.7 to 2.6 mcg./g. Both raw husked and parboiled undermilled rices underwent flavor changes so severe that they were unacceptable. Raw undermilled and raw milled rice kept well.

Flavor changes appear to be associated with increase in peroxide number of fats.

These properties increase most rapidly with raw husked rice and pass the organoleptic rancidity level in about 8 months under the storage conditions of the trials—*Journal of the Science of Food & Agriculture*, Vol. 5, No. 9, 405-9, Sept. 1954.

Yeast in Meat Brines

Meat brines have frequently been found to have a considerable yeast population which increases during use and may reach 6-7 millions per ml. at the end of prolonged curing periods.

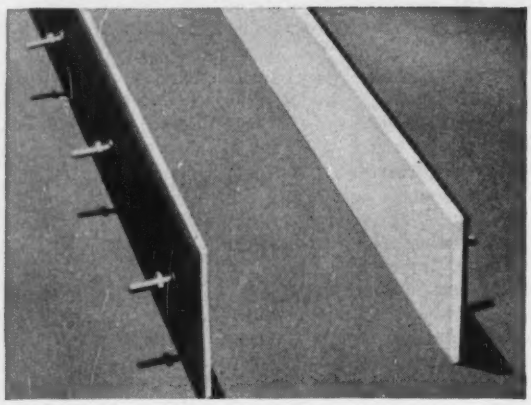
By streaking plates of acidified dextrose agar containing 6-8% salt, 89 isolates were obtained from 9 casks of brined meats in a commercial packing plant. All were found to be species of *Debaromyces*, with 86 identified as *D. membranefaciens* var. *Hollandicus*, and three as *D. klöckeri*.

The yeasts have a high tolerance for salt and organic acids; they grow well at low temperatures (35 F.), and they can assimilate a variety of carbon compounds.—*Applied Microbiology* Vol. 2, No. 5, 30-302, 1954.

Data on Carbonating Mineral Water

In aqueous solution carbon dioxide exists in four forms, CO_2, H_2CO_3, HCO_3^-, and CO_3^{--}, depending on the CO_2 pressure and salts and acids present in the water. If CO_2 is added to a solution of $NaHCO_3$, the pH drops from 8.6-8.8 to 5.5, at which point

NO smear stick mess



■ TEFLON-faced guide rails on conveyors and packaging machines protect food products and packages from process to market—are rapidly replacing metal guide rails throughout the food industry.

TEFLON is the most antihesive material known. Nothing will stick to its clean, slippery surface. Nothing can penetrate it and contaminate materials handled. Chemically inert—it is tasteless, odorless, impervious to food acids. Handling spoilage is minimized, sanitation is simplified. Packages don't become streaked or smeared—stay fresh and appealing for dealers' shelves.

TEFLON-faced steel guide rails are fabricated by the United States Gasket Company in any length up to 12 feet long and in widths from ½ in. to 2½ in. One-eighth in. thick duPont TEFLON is bonded on one-eighth in. steel bar by a special U. S. G. technique (patents pending) which leaves the surface unmarred by mechanical fasteners. Shot-welded studs on the metal side are provided at designated points for attaching to equipment. Special shape guide rails are also available to specifications.

Write for Bulletin No. GR-301.

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about 10% of the gas will be present as hydrogen carbonate ion (HCO_3^-), 90% as CO_2 and H_2CO_3.

At one atmosphere pressure and 55.4 F. solubility of CO_2 is 1.086 volumes. Water saturated with air at 1 atmosphere and 57 F. tends to lose air when it is introduced into a carbonator. Equilibrium is reached, as air escapes from the water and charged water is drawn from the carbonator, at 4.4 ml. of per liter.

As long as air-saturated water is used for carbonation, the same equilibrium is finally reached, but it takes much longer if the carbonator is filled with air when operation starts. It is much better therefore to flood carbonators with water or CO_2 during week end shut-downs than to drain them. Carbonated water bottled with excessive air tends to be wild when poured and to lose gas rapidly—*Beretning on det 10. Skandinaviske Bryggeritekniske Mode i Kobenhavn 6-9, 130-38, January 1954, (in Danish).*

Gas Ripening Tomatoes

Speedier ripening with smaller amount of decay are among advantages of a new method of ripening tomatoes for per-packaging.

Technique consists of placing tomatoes in storage containing 1 part ethylene gas to 5,000 parts air for 4-5 days at 68-70 F. Room is completely ventilated daily to remove accumulated CO_2 and replenish O_2 consumed, then filled with gas-air mixture—*Marketing Activities,* (USDA Agr. Marketing Service, Wash. 25), 13-14, Nov. 1954.

Fungi on Strawberries

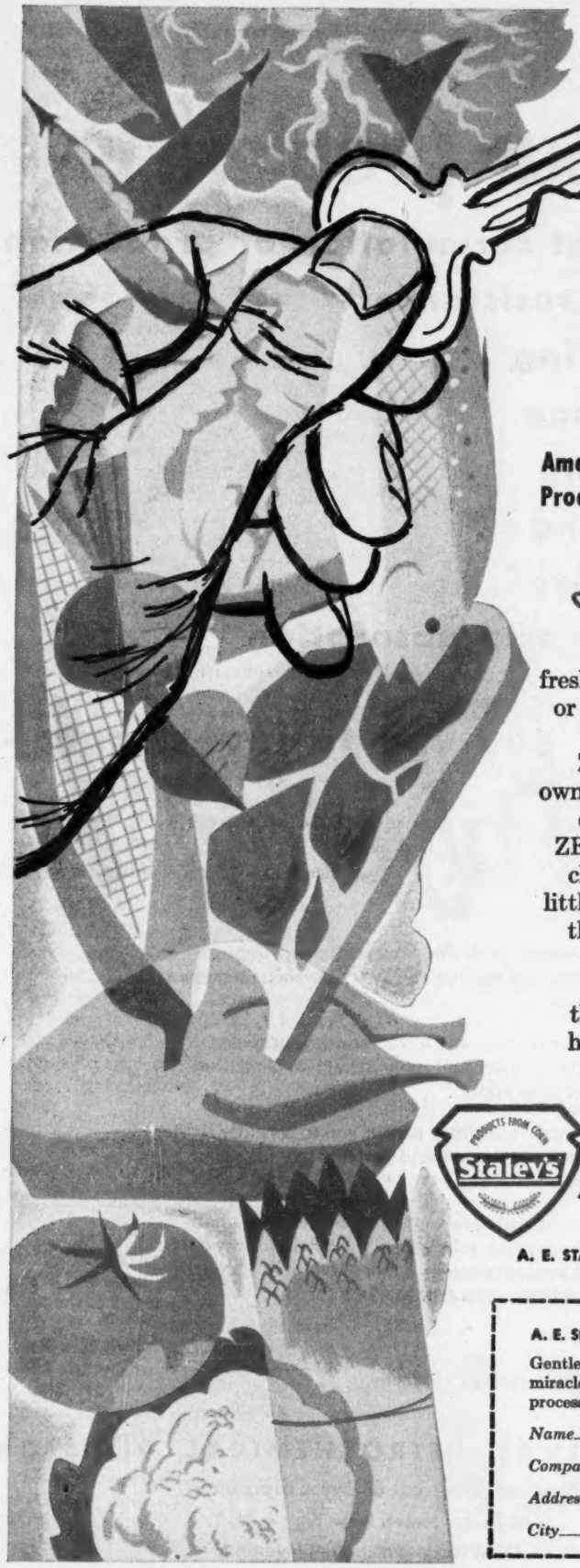
Strawberries can harbor a large variety of fungi, many of which cannot be associated with softening or pectolytic breakdown.

During the 1953 season, in the Benton Harbor, Mich. area, green and ripe strawberries were studied for surface and subsurface fungal types that normally occur. From 1080 plugs on individual fruit, 2107 fungi were isolated, 1948 from the surface and 159 from below.

Subsurface infection increased as fruit ripened. Species of *Hormodendron* were most frequent on the surface (568 isolates) with yeasts second (220 isolates). Such well-known genera of molds as *Rhizopus, Alternaria, Pullularia, Penicilliumn* and *Botrytis* were also common.

Botrytis cinerea and *Pezizella lythri* were the most common subsurface infection, though *Rhizopus nigricans,* yeasts, and species of several other genera were also found.

On inoculation into sound fresh



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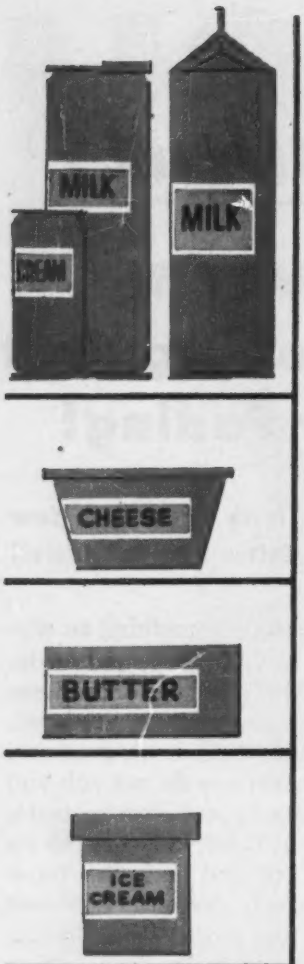

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strawberries, *B. cinerea*, *R. nigricans*, and *Aspergillus* spp. produced the greatest amount of macroscopic degradation, the degree of which was always correlated with the pectinase content of affected fruit. The variations found emphasize the view that the mold content is not necessarily associated with pectolytic breakdown of the product—*Applied Microbiology*. Vol. 2, No. 5, 253-58, 1954.

England Adopts Trays For Mushrooms

The tray system, an American development, marks the present stage in the evolution of Britain's mushroom industry. In earlier systems, they were grown on ridge beds of manure and soil laid in sheds, caves, and even in the open in southern England. Later flat beds became popular, and these gave way to shelf beds 6-8 tiers high. Finally the tray superseded the other methods.

In this system, boxes are filled mechanically with compost and conveyed to a pasteurizing room where desired temperature is maintained for 12 to 14 hrs. Circulating fans insure ventilation and even distribution of heat and moisture. When temperature drops to 80 F. trays are spawned, and incubation proceeds for 14 days at 70-75 F. Trays are then conveyed to cropping quarters, being cased en route with an even layer about 1 in. of soil.

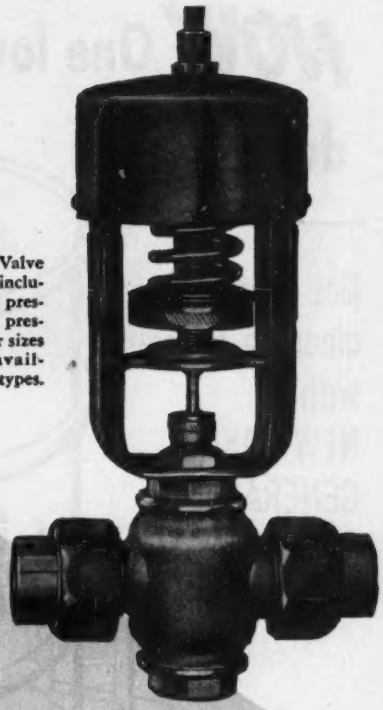
In the cropping room the trays are stacked after the fashion of open brickwork. Here special attention is paid to temperature, ventilation and watering. First mushrooms may be picked in 2-3 weeks, and at successive intervals of 10-14 days. A normal cropping period is six weeks, and total yield may be 2 lb. per sq. ft.—*Food Manufacture*, 343-47, Sept. 1954.

Direct Microscopic Test For Citrus Concentrates

A rapid method has been devised for estimating microbial content of frozen citrus concentrate by direct microscopic examination.

It has the obvious advantage of speed over the plate count procedure which requires an incubation period of at least 48 hr. Also, it successfully meets many of the difficulties encountered in earlier attempts to use the direct miscroscopic method.

Orange concentrate is reconstituted to 12 deg. Brix with a 0.7 percent NaOH solution. Then equal volumes of this juice and stain solution are



REGULATOR No. 991. Valve sizes from ¼" to 1½" inclusive. Maximum initial pressure 150 lbs. Reduced pressure, 5 to 55 lbs. Other sizes and pressure ranges available in companion types.

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● This Fulton Sylphon pressure regulator can give you better-than-ever control of pressure in steam, air, gas, oil or water lines. It can be used as an automatic regulator for dropping from high to low pressure. Or it can be used to maintain a steady pressure when supply pressures fluctuate. In addition, it can serve as a bellows "motor" control valve in pneumatic or hydraulic systems.

When equipped with the proper valve, it serves as a relief valve to protect other equipment against excessive pressures. For details on this and other regulators in the extensive Fulton Sylphon line, write for Catalog XG-D.

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Of course, the night man was real pleased because this new material knocked three hours off his regular clean-up time and left all the equipment shining like a waxed banana.

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mixed and 0.01 ml. of mixture is transferred to a clean slide and spread over a 1 sq. cm. area with an inoculating needle. Slide is dried by infra-red lamp, and examined under oil immersion.

Using a microscope with a field 0.16 mm. dia., examine 100 fields and count cells or clumps. Multiply by 10,000 to obtain estimated count per ml. of reconstituted juice, and again by dilution factor to obtain estimated count per ml. of concentrate.

Number of fields examined will vary with purpose of test. A small number may suffice when making control tests on concentrate production. For more accurate estimates on low-count juices, number of fields examined must be large enough to make sure that representative areas are observed. Method can be used to detect microbial build-ups in evaporators.—Bureau Agr. & Ind. Chem., USDA, *AIC-365*, Nov., 1953.

Revised Procedures for Drying Tree Fruits

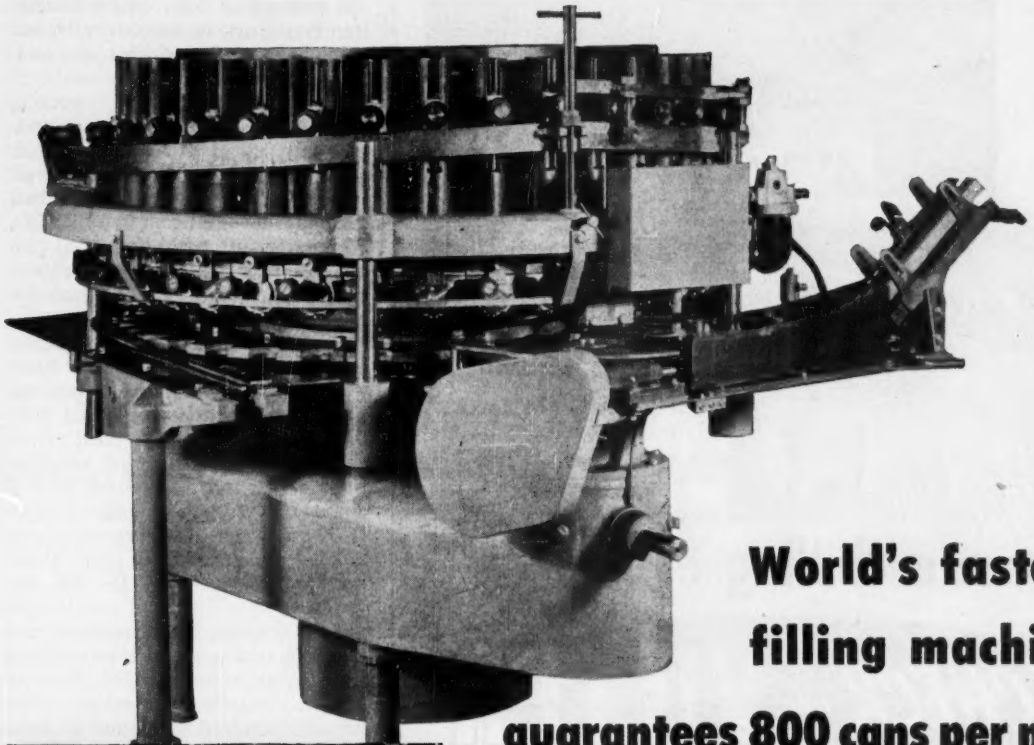
According to revised Australian procedure first requirement for a high grade sun-dried fruit is a uniformly ripe, high quality fresh product.

Apricots should be picked "eating ripe"; peaches, when well colored and close to maturity; pears at the hard stage and ripened in covered boxes to exclude light. Legal maximum SO_2 has been increased from 14-21 gr. per lb., by revised procedures to insure longer shelf life in warmer parts of Australia.

Sulfuring process is carried out in air-tight chambers, several small ones being preferred to one large one. Up to 8 lb. SO_2 per ton of fresh fruit is usually ample. Sulfur pit is located just outside chamber, with free entrance into chamber and vent into pit. Draft is arranged so requisite quantity of S will be consumed in desired period.

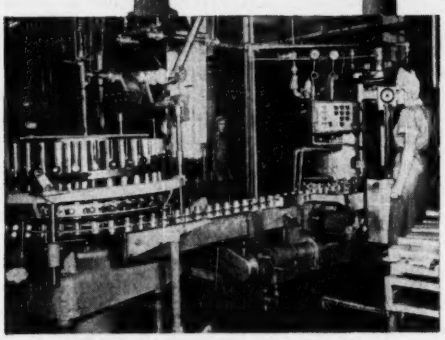
Weight of fruit in charge is ascertained by weighing 2 or 3 trays and striking an average. Adequate sulfuring is obtained in 4-6 hr. if "dense fume" method is used, but may require 8-10 hr. in so-called "closed chamber" if there is sufficient air leakage to maintain combustion. Longer sulfuring periods are used for fruit to be moist-packed.

Correctly sulfured fruit has firm core, easily detachable skin, with exudation of some juice into cup, and gen-



World's fastest filling machine guarantees 800 cans per minute

New Pfaudler 35 Station Piston Filler!



More than 800 cans of baby food a minute are filled at H. J. Heinz Co., Leamington, Ontario, with this new Pfaudler 35 station filler. Filler, world's fastest, was developed at Heinz's request by The Pfaudler Co. with cooperation of Continental Can Co.

On a single machine, you can fill a container of your product for every man, woman and child in a city the size of Riverside, California (population 46,764)—in less than 1 hour!

That gives you some idea of the production advantages of the new Pfaudler 35 piston filler. It's the world's fastest. We *guarantee* it will fill 800 cans per minute, in all sizes up to 16 oz. And we've seen it go higher than 1000!

Breath-taking production speeds on the new Pfaudler 35 are easily regulated with these special features:

Magnetic brake stops the filler within .2 second after you apply it, and is synchronized with a similar high-speed brake on the closing machine.

Electrically controlled no-can-no-fill mechanism is activated pneumatically for split-second spill prevention.

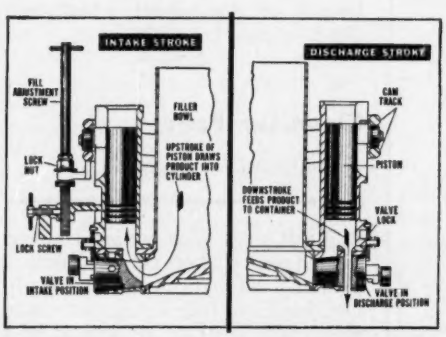
Adjustable tilt—Cans ride on a track which tilts them for filling. Angle of tilt adjusts to speed of filling and product.

Precise filling—In most cases, we can guarantee an accurate fill within ±1/10 oz.

Maintenance of the machine is simple. You have only 3 points on the entire filler to lubricate by hand. Bearings in the base and all gears are automatically lubricated. Cleaning is also easy, because only the valves and pistons need be removed, and you don't need any tools to do the job.

Challenge us

Make us prove to you that the Pfaudler 35 will actually pay for itself in lower production costs, higher production. Mail the coupon below for full details.



Filling action is illustrated above. The diagrams show position of operating parts on opposite sides of the machine.

THE PFAUDLER CO., Dept. FE-12, Rochester, N. Y.
Tell me more about your "Pfaudler 35" piston filler.

Name_____

Title_____

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Address_____

City_____ Zone_____ State_____

THE PFAUDLER CO., ROCHESTER 3, N.Y.

For more information, use coupon on last page.

OCOMA

BERRYSVILLE, ARKANSAS

for rapid chilling of poultry

CHECK with VILTER

Processing approximately 100,000 pounds of poultry is a daily accomplishment at the Ocoma Foods Company of Berrysville—an accomplishment made possible largely because of the time and labor saving Vilter refrigeration equipment used for rapid poultry chilling.

The core of this rapid poultry pre-chilling system is a 30 ton Vilter Pakicer which produces a fine crystalform ice —Pakice. Pakice is ideal for use in poultry chilling since it has no sharp corners or edges and, therefore, does not damage the tender bird tissues. For quick chilling of birds, alternate layers of poultry and Pakice are placed in galvanized bins, the Pakice being replenished as it melts, until the fowl reach the required temperature. By employing this efficient chilling system, Ocoma can chill a 500 pound vat of chickens in two hours—half of the time required previously!

This Vilter Pakice system is providing a reliable performance at Ocoma and is continuing to make substantial savings for the plant.

Vilter has another famous product, the Polarflake ice maker. This unit manufactures crisp, cold ice flakes ideal for poultry packing and shipping purposes.

Check today; there is a good chance that Vilter refrigeration know-how can do the same for you.

Vilter

Your nearby Vilter Representative or Distributor will be glad to show you how Vilter refrigeration can help you in your plant.

REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, MILWAUKEE 7, WIS.

Air Units • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Water and Brine Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pipe Coils • Valves & Fittings • Pakice and Polarflake Ice Machines

eral evenness of color on cut surface. Resulfuring may be necessary after wet and humid weather which causes slow drying and loss of sulfur.

Trend toward "moist" packing necessitates observance of close grading, adequate moistening, and avoidance of long storage. Oversulfured fruit can be brought down to permitted maximum by immersion in 10% H_2O_2 solution for 10 min. Foregoing procedure applies to apricots, peaches, and pears, with minor modifications for each.

Prunes should be fully ripe before harvesting. Sheets are placed under trees and natural drop may be assisted by shaking branches. Normal fruit drop produces a heavier dried article of better flavor than that obtained from picked fruit. Harvested fruit is dipped in a caustic soda bath—1 lb. to 25-50 gal. water—just long enough to produce fine cracking of skin. Treatment must be varied for different varieties.

After dipping, fruit is drained and spread on drying trays. Before exposing fruit to sun in hot weather, trays are stacked until fruit has wilted. After process starts fruit should not be moistened by rain or heavy dew. When about ⅔ dry, it is spread on sheets of Sisalkraft until drying is completed.

When fruit is dry enough so flesh is tough but plyable and will not exude juice when squeezed, it is ready for sweating. This is accomplished in boxes over a period of 5-6 weeks, with occasional pouring from one box to another. In the factory moisture is brought to about 20% by dipping or steaming. Mold is likely to develop with moisture content greater than 25%. For commercial reasons it is desirable to process the dried prunes progressively according to market requirements, rather than incur long periods of storage which makes the product less attractive in appearance.—*Journal of Agriculture*, (Australia), 381-89, April-May, 1954.

—*End*—

Clean-Up Power

—*Continued from page 95*

And this point bears pertinent weight in food plants, where sanitary habits of personnel are particularly in point. In fact, hand and face wiping can run to more than 60% of all wiping in a plant, according to a check by the paper company.

Trial Is Clincher

A 90-day test preceded our final decision to adopt the new product. We

distributed the wipers throughout the plant, but at the same time kept the former wipers in supply in the various departments. Then we awaited foremen reports. In brief, the initial slight resistance of the employees soon gave way to acceptance as the workers saw for themselves the advantages of the new wipers.

Result was a marked improvement in plant housekeeping. Also, favorable reports came from laboratory, garage, plumbing shop, and other divisions.

In truth, there was no need to wait out the 90-day trial, since the foremen were quickly unanimous in reporting approval of the new way.

End (*Resume reading on page 96*)

Curbing Absenteeism

—*Continued from page 60*

An accurate cost appraisal will be helpful both in planning what to do and in evaluating results. Of course, indirect as well as direct cost must be included. When salaried workers are absent, overhead losses must be computed as well as time losses. Attendance figures alone will not provide all the information necessary. They must be supplemented by other data, such as the lag behind production schedule, waste, spoilage, training costs, and lowered morale resulting in increased turnover. Strive to determine in dollars and cents what absenteeism actually costs the company.

When costs are known, balance them against estimated correction costs. Keep in mind that the personnel expense is like an iceberg, only a small portion showing above the surface. The hidden costs may turn out to be much more than the apparent cost.

When all available facts are in, it is then important to analyze carefully. Determine whether or not the proportion of people, in any group, who fail to meet a certain standard of attendance, say less than one absence per month, is related to such factors as department size, nature of work, quality of supervision, rate of pay, incentive system, adequacy of personnel selection and training, or what?

Next step is to take action—which will, of course, depend upon the results of the analysis. In any event, it is best to keep supervisors thoroughly advised. Those who do not keep their own attendance records may be shocked when confronted with the actual record. And discussions with them often lead to further insights regarding causes.

Then, too, your discussion with supervisors may lead to development

IS YOUR *Packaging* IN "APPLE PIE" SALES ORDER?

Automatic HIGH SPEED CAMPBELL WRAPPER —

- Keep pies and cakes oven-fresh
- Package-wraps without crushing
- Speeds up packaging products
- Cuts labor and material costs
- Increases shelf life—customer appeal

Fruit, berry and custard pies . . . frosted or cream filled cakes of endless variety —you can package wrap them all *without damage or crush* on the Campbell Wrapper. Our exclusive "float" wrapping method is the reason. You'll speed-up production, too, by packaging *60 and more* individual or large service pies per minute; cakes and cookies from *100 to 300 units per minute* — And, all at lower labor and material cost to you! In most cases, one person operates and tends several machines at the same time, and there's no need for trays or stiffeners *unless desired!* Modern wrap materials of every description for crimp, heat or glue sealing may be used. Plan now to *increase* product production at *lower* packaging costs with this versatile, new, modern wrapping machine.

And—the ideal wrapper for—

COOKIES, CRACKERS AND DONUTS, CANDIES AND CONFECTIONS, PACKAGED FOODS, PREPACKAGED TABLE MEATS, BACON, CHOPS AND PATTIES, ICE CREAM BARS, NOVELTIES, CITRUS FRUITS, VEGETABLES, CHEESE, DAIRY PRODUCTS, HARDWARE, MACHINE PARTS, TISSUES, NAPKINS, TOWELS, PAPER AND CLOTH SPECIALTIES, BANDAGES, SOAPS, PHARMACEUTICALS AND 101 VARIED ITEMS OF REGULAR AND IRREGULAR SHAPE.

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We are contributing to the nation's defense program by providing a large part of our increased production facilities for building precision armaments. Civilian orders are filled on a reasonable time basis only.

New Free Booklet
Describes and illustrates how the Campbell Wrapper packages many nationally known products.

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HUDSON-SHARP MACHINE CO. • GREEN BAY, WIS.
Manufacturers of Aniline and Gravure Presses, Folders, Interfolders, Laminators, Waxers, Embossers, Slitters, Sheeters, Roll Winders, Packaging Machines, Crepers and Tissue Converting Units.

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or shipping room

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Standard cuts conveying costs in *either* or *both* places

To speed operations, reduce breakage, increase safety, save manpower, time and money — mechanize handling with Standard conveyors. *It's an investment in efficiency that will pay you for years.*

Standard can be of expert service to you on any conveyor need. This includes complete engineered systems of conveyors for production, assembly or packing lines . . . or a simple lightweight section of roller conveyor for "spot" use in warehouse or shipping room.

Standard designs and builds all types of "package" conveyors: power and gravity, belt, roller, slat, push-bar and special units as well as a wide line of self-contained portable work-savers.

The range, versatility and flexibility of Standard Conveyor equipment have been developed in nearly 50 years of service to industry. Call Standard's representative listed in your classified phone book. Send for Standard's General Catalog — address Dept. FE-12½

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PNEUMATIC TUBE SYSTEMS

of new policies. These may determine what satisfactory attendance is expected to be, while also indicating procedures for keeping all concerned regularly informed about attendance, and means of communicating the requisite information to employees.

This latter may be undertaken either as a project in itself or as an integral part of a performance-rating program. Teaching supervisors about such communications is particularly helpful.

If the move against absenteeism is merely an effort to "put out the fire," permanent results are not assured. True, when such actions are taken, attendance does improve. But it is then too easy to dismiss the problem. Rather, there should be borne in mind the possibility that absenteeism will go underground out of fear and then later crop out again, or appear in some other form such as lethargy on the job, lowered efficiency, and reduced productivity.

Once a true absentee cure is applied, records should be kept meticulously and scrutinized regularly for danger signals. The latter are readily noted in well-kept attendance data.

As important as anything is the training of supervisors to discuss every absence with each stay-away employee immediately he returns to work.

End (Resume reading on page 61)

Depreciation Formula

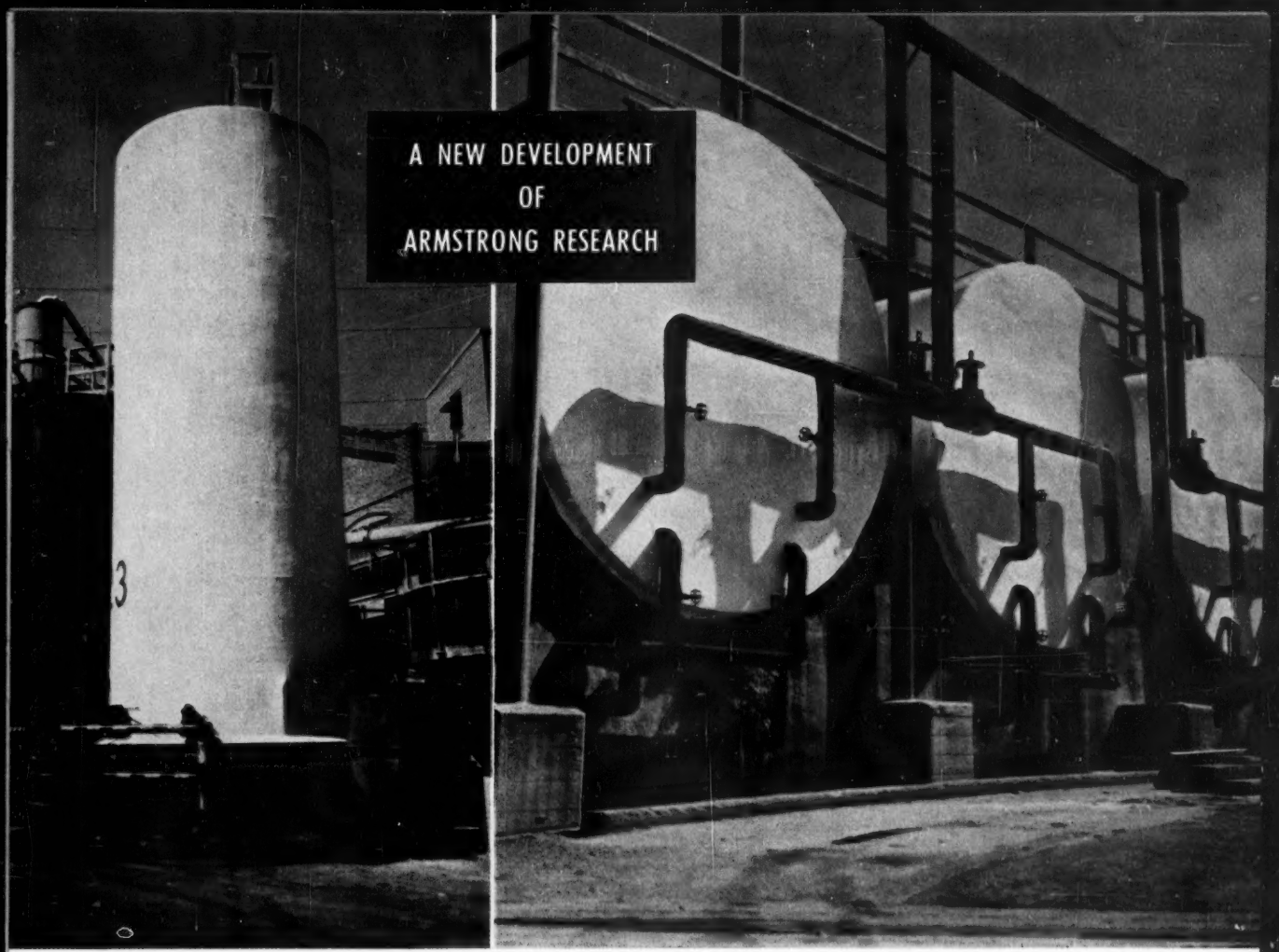
—*Continued from page 68*

advantage primarily to companies using a large investment in plant and equipment relative to labor and materials.

Effect on volume of capital spending. By holding out the attractions of faster recovery of investment and postponement, if not permanent savings on taxes, the new depreciation policy provides an incentive to spend more on new buildings and equipment. This would mean larger and more efficient capital plant for industry in general and more orders for construction and machinery industries. All of which points toward greater business activity in the immediate future and a more productive economy in future years.

For the individual company, however, there is the possibility that fast depreciation will offer temptations to make investments that might not be regarded as wise under a straight-line policy. The merits of the investment itself are still the most important consideration.

End (Resume reading on page 69)



Insulcolor . . . *a rugged plastic finish for insulation— indoors and outdoors*

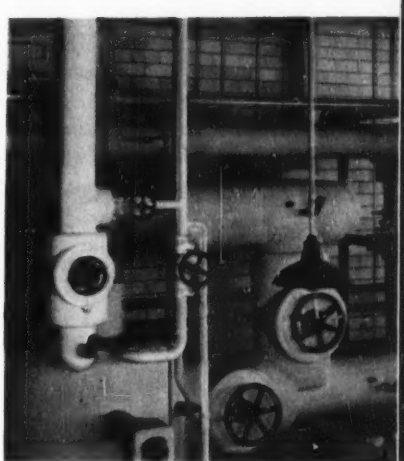
Now you can apply a protective finish to insulated tanks and lines that serves as color identification, too. New Armstrong Insulcolor provides a durable plastic finish in seven colors or white.

Under the most severe outdoor conditions, Insulcolor* will not crack, craze, or peel. The rugged plastic film withstands extremes of temperature and has excellent water-resisting properties. Bumping and abrasion won't damage Insulcolor's smooth, tough surface.

Used indoors, Armstrong Insulcolor is both finish and color key for all insulated steam, refrigerant, and cold water lines. It is also being widely used over cork insulation on equipment, air-conditioning ducts, and in cold rooms. Insulcolor is quickly and easily applied by brush or spray gun. It requires little or no maintenance.

Available through Armstrong's Contract Service, Insulcolor is one of the new products developed by Armstrong Research in the industrial insulation field. For full details on Insulcolor and Armstrong's Insulation Contract Service, call your nearest Armstrong office or write Armstrong Cork Company, 205 Stratton Street, Lancaster, Pennsylvania.

*Trade-mark



Both insulation finish and code color, Insulcolor eliminates stenciling or the extra expense of painting lines with identifying colors after the finish has been applied.

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Shortenings engineered to order

Modern shortenings are a product of careful design from known principles, like bridges or TV sets. One producer wants a shortening that will produce a very fine crumb structure. Another wants one that will work well in packaged cake mix. Still another wants to make the best possible bread shortening out of a certain fat available to him at a favorable cost. And so the questions come at us.

Among the big differences between the primitive approach to shortening design and the modern approach are the kind and proportions of emulsifying ingredients. Emulsifiers, made themselves from wholesome natural fats and concentrated by molecular distillation,* are our specialty. Many of the principles of their effectiveness are still being worked out in our laboratories, for they are too new for the textbooks. Some of the work is necessarily on a test-tube scale, but more and more the greater part of it is in making up commercially feasible shortenings and trying them under practical conditions.

All this being true, isn't it a good idea to make sure your shortenings are up to date by keeping in touch with us? ***Distillation Products Industries,*** Rochester 3, N. Y. Sales offices: New York and Chicago • W. M. Gillies and Company, Los Angeles and San Francisco • Charles Albert Smith Limited, Montreal and Toronto.

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distillers of emulsifiers made from natural fats and oils

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Also...vitamins A and E

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SWIFT'S PICK-UP GUMS SERVE EVERY LABELING NEED

Whether you're labeling at 35° or 150°, on terne plate, tin cans or glass . . . at 100, 200 or 400 cans per minute—*Swift's* new label is news for *your* labeling requirements.

Built for speed, Swift's new, improved Hot Pick-Up Gums are resin-based for instant grab . . . come in convenient chunk form for quick, uniform melt down and easy use. From Grade C (cold cans) to WR (wide-range), there's a grade to meet your canning temperature and speed requirements.

As smooth machining as they are versatile, Swift's Pick-Up Gums do not string or build up. They're strong on tack, non-foaming and *long* in mileage economy.

Remember, too, that Swift's adhesives and glue products serve packing and packaging needs in all phases of the food industry. From labeling to shipping, to *easy* opening, the name *Swift* means quality, service and dependability.

SWIFT's Lap End Pastes. Fast machining, quick, strong tack—for a wide variety of label stocks. Rust inhibited, water resistant, and resins for difficult surfaces.

SWIFT's Easy-Open case sealer. No opening tools required . . . tug breaks the seal.

SWIFT's Evertite glass labeling adhesives. Three grades serve wide range of machining and label stock requirements. Write today for the new bulletin on Swift's quality canning adhesives.

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COMPLETE SANITATION

is a feature of the special sanitary

SPARKLER FILTER

of particular interest to food processors

A completely sanitary Sparkler filter with sanitary piping and fittings.

You can see at a glance why Sparkler filter plates are the most sanitary plates ever designed.

All surfaces, inside and out, are easily accessible for thorough cleaning. The top screen that supports the filter paper, a center separator, and the bottom plate is all there is to it. These parts can be separated without unscrewing bolts or nuts. The tie rods of the complete plate assembly holds the plate parts firmly together without danger of bypassing.

With most other types of filter plates the inner surfaces are inaccessible and cannot be cleaned; contaminating food particles are locked in and the first run of a new batch frequently must be discarded or rerun through the filter to obtain a pure product.

With Sparkler sanitary plates, a pure product is obtained right from the start, and continues pure with fine sharp filtration to the end of the filtering cycle.

Sparkler filter plates can be removed for cleaning in one unit and a fresh thoroughly clean set lowered into the filter tank. This reduces down time to a matter of minutes.

Sparkler filters are available in stainless steel, monel, nickel, bronze, or Hastelloy, steam or brine jacketed. Available in a range of capacities up to 10,000 G.P.H.

They are efficient in filtering all food products such as:—

Candy Scrap	Liquors	Lard
Chicken Broth	Milk	Deep Frying Fats
Cider	Molasses	Beet Sugar Syrup
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For personal service on your filtration problems Write . . . Mr. Eric Anderson

MSG's Perk-Up Power

—*Continued from page 72*

only the highest one resulted in a detectable flavor change, the first check was on preference between the untreated control peas and those with 0.6% MSG. When this comparison resulted in no preference, a second test was conducted with 0.8% MSG. When no preference was established at this high level, work on frozen peas was discontinued.

Compiling the Data

Even though several tests were conducted on each food, only one set of data is given, namely that found to be most favorable to MSG. Triangle-test results were merely preliminary and have been entirely eliminated. Preference tests other than the specific ones shown in Tables II-V gave insignificant results and so were omitted.

However, in referring to the tables, it should be kept in mind that the MSG concentration shown for each food is either at or above that found necessary to bring about a flavor change, and that no concentration above this level gave a more favorable result.

Where not otherwise indicated, MSG concentration represents percent by weight of the food as prepared and ready for serving. For certain foods (indicated by footnotes in Tables) the given concentration represents percent by weight prior to cooking or processing. Within each table the foods have been grouped according to the amount of improvement effected. This corresponds to the statistical significance level as shown in the last column, except in Table V, where four items show a loss in preference.

How They Rated

Canned vegetables (Table II) were most consistently improved. Of the 13 items, only 3 failed to show at least a trend toward improvement. Improvement was not as consistent among the miscellaneous vegetable recipes (Table III), but again a wide variation in effective MSG concentration was found.

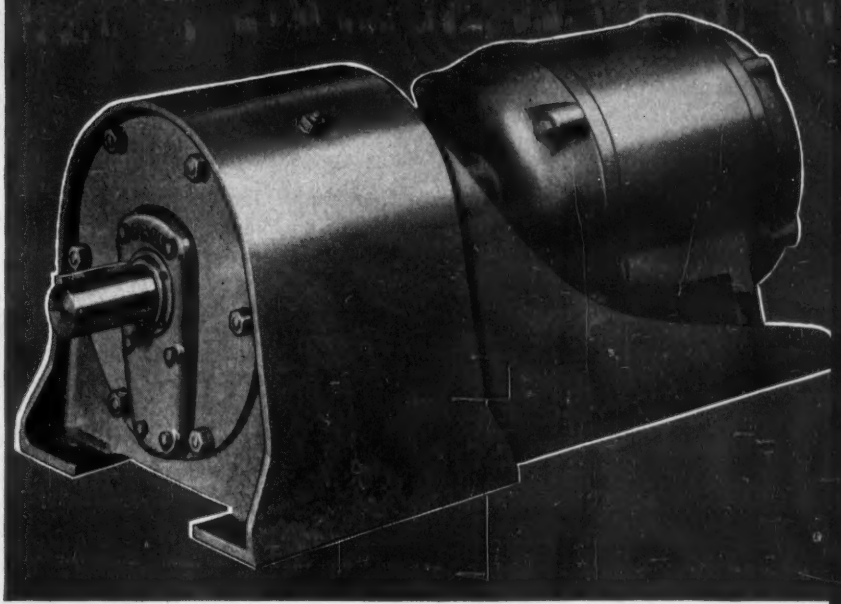
There was improvement with most of the meat, poultry, and fish items (Table IV). Here again, only 3 of 13 items failed to show at least a trend.

Results with miscellaneous foods and recipes (Table V) were much less favorable to MSG. Only 5 of the 17 items were improved, and there were 4 foods where detection of a flavor change was accompanied by a loss in preference.

With the All-Motor Type

ALL-STEEL FALK Motoreducer

you can interchange motors in minutes... *on the job!*

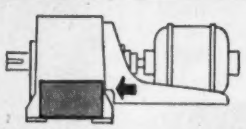


Fast, easy maintenance gives savings in time and money

With the *all-steel*, All-Motor type FALK Motoreducer . . . the only complete and compact motorized reducer with a separately mounted, resilient Steelflex coupling-connected motor . . . you can replace or interchange motors, *or even parts*, in minutes—*on the job*, without long and costly "down time"! Ratios can be changed (within capacity) without motor modification.

Any make, speed, or type of standard foot-mounted motor within the unit's AGMA rating is usable *without modification* on this All-Motor type Motoreducer. Motors with variable speed drive arrangement can be used, if desired. No "partial" motor or special shaft is required in event of motor replacement—simply use a complete motor, available for quick delivery from factory or local stocks without expensive delays.

Add to these exclusive maintenance-saving advantages the FALK "In-built" Factors, described at the right, and you have an unbeatable combination of quality, application adaptability, dependability, long-range economy, and dollar-for-dollar value. Write for Bulletin 3104.



Every FALK Motoreducer has these "In-built" Factors—

Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.

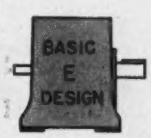
Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

Sealed Housings. Dual closures and one-way vents keep oil *in*, dust and moisture *out*. Units are splash-proof, leakproof, dustproof.

Precision Gearing. Heat treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.



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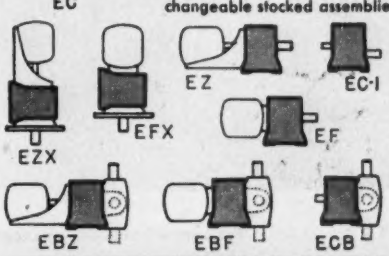
The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.



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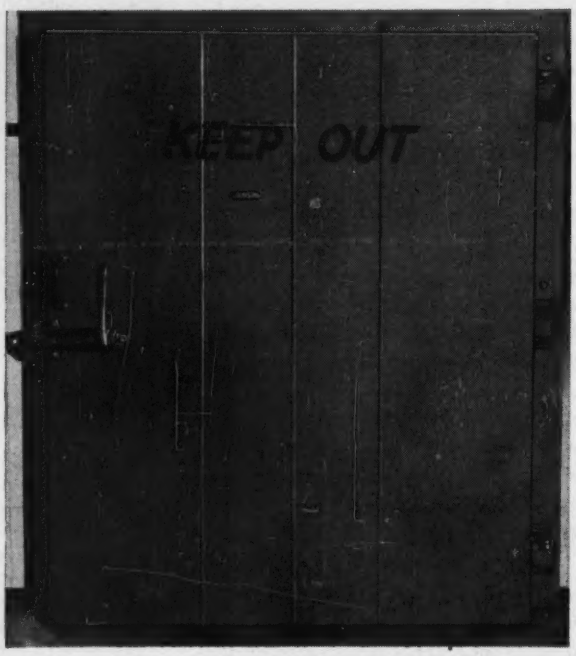
JAMISON SUPER FREEZER VESTIBULE DOORS HOLD DOWN REFRIGERATION LOSSES when packaged ducklings are moved to sub-zero rooms.

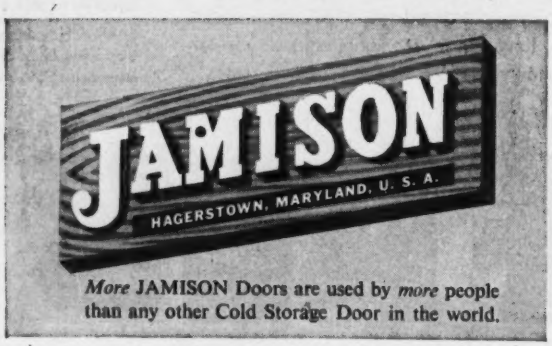
At the Riverhead Duck Processing Cooperative, Inc. in Riverhead, L.I., succulent Long Island ducklings are processed and frozen by the thousands for appreciative gourmets.

One of the ways the Cooperative assures operating efficiency is by using Jamison Doors for the sub-zero blast freezing tunnels and storerooms. Among the 18 Jamison Doors installed, there are 12 Super Freezer Doors, 3 Super Freezer Vestibule Doors, 2 Lo-Temp Doors, and 1 Lo-Temp Vestibule Door.

Jamison Doors of standard or special construction will also meet your needs. Consult your architect or write to JAMISON COLD STORAGE DOOR COMPANY, HAGERSTOWN, MARYLAND.



BATTERY OF JAMISON SUPER FREEZER DOORS maintains a tight seal on sub-zero blast freezing tunnels.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More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.

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Since these items have been placed together merely for convenience, and since a number of foods are included with which the use of MSG has never been seriously recommended, the low frequency of improvement has no general significance. The table includes 4 soups—and significant improvement was established for 3 of them. It is of interest to note the very low concentrations of MSG which caused a detectable flavor change in some foods, ranging down to 0.05% for corn meal mush and 0.06% for chicken soup.

Table VI shows what happened to a number of foods classified according to the general flavor types of sweet, sour, and bland. The grouping is arbitrary, particularly in regard to bland, where many more items, such as certain vegetables, might also have been included. Some foods which have two dominant flavor characteristics (e.g., orange juice) have been included in two classes. Additional types were not established, since they would have been even less well defined.

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Above article is taken from a talk, "Monosodium Glutamate and Food Preference," given at the 13th annual meeting, Institute of Food Technologists.

End (Resume reading on page 73)

Streamlined Conversion

—Continued from page 63

such that conventional high speed V/W type units were considered most economical when the plans were finalized.

First and second stage pre-cooling loads were calculated to be 50.6 tons of refrigeration, including cooling unit pump and fan motor load. To control the temperatures accurately, a 12-cylinder unit was selected to handle this requirement.

Each of the first stage pre-cool units have a capacity rating of 15 tons of refrigeration with a 20-deg.-F. evaporator temperature. Capacity rating for the second stage units are 11 tons with 10 F. evaporator temperature. The compressor capacity at normal operating conditions and the pre-cool unit capacity was slightly in excess of requirements.

The main belt freezing load was calculated at 190 tons. This included transmission, product load of 8 tons/hr., fan motor load, and miscellaneous losses. A — 37 F. evaporator temperature is required to obtain — 18 F. air off the coils and — 10 F. air returning to the coils and 0 F. product temperature.

Final equipment selection resulted in an actual air rise of 7.5 deg. when 8 of the 10 fans were in use (the other 2 fans were considered non-effective since the evaporator coil was being defrosted), and a total coil capacity of 192.8 tons when four were operating in each tunnel.

The two rotary boosters (at 6.8 in. Hg vacuum suction and 22 psig discharge) are rated at 192 tons. A direct expansion liquid inter-cooler is used between stages of compression. This materially reduces the required size of the second stage compressors which, to balance at 22 psig, suction and 165 psig. condensing pressure, are one 16-cylinder V/W compressor and one 8-cylinder V/W unit.

Possibility of re-using condenser water in plant operations was studied. Peak plant consumption was calculated at 750 gpm. for pea processing and less than 500 gpm. for corn. But condenser requirements were 1,030 gpm., which meant a waste of 280-530 gpm., or from $36 to $71 per day. A quick check proved that a cooling tower was required and would soon pay for itself.

The plant being situated on the banks of the Skagit River, the natural reaction would be to use this ample source of cooling water. In fact, there was a suction pipe and pump connection already in the river, these being used at one time for retort cooling canned peas and corn.

The headwaters of the Skagit are in the Canadian Rockies, and occasionally glaciers dump into the river, causing the water to become milk white with fine colloidal material which would choke off a condenser in a matter of several days. Here, experience guided what is sometimes called "blind slip-stick engineering."

A 16-position recorder in the engine room and a gage board are the nerve and pulse of the operation. From these instruments the operating engineers know at all times temperatures and pressures in the system.

End (Resume reading on page 64)

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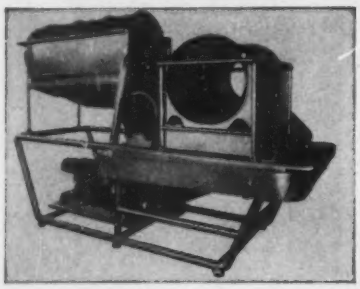

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Questions & Answers

THIS MONTH'S PROBLEM

Glass Gets Into Jars

Question—We fill various types of food products into glass containers on several different automatic filling lines. From time to time, we receive reports indicating the presence of glass fragments in finished products. Can you suggest how we can detect these fragments before shipment as well as prevent them from getting into the glass container?

OCTOBER PROBLEM

Water Softener on "Fritz"

Question—Recently, a quality impairment in one of our products was traced to an excess of a mineral which we thought was being reduced to a satisfactory level in our zeolite water softener. Our water analysis has not changed appreciably during the several years that this softener has been giving us satisfactory performance. We are, therefore, at a loss to account for the present difficulty. Can you help us find the cause and cure?

Answer—We suggest that you review the operating cycle of your softener and determine the number of gallons it is supposed to treat between regenerations.

Probably, you have an automatic control which meters proper gallonage and then switches the valves to accomplish regeneration before re-cycling. Then arrange to make chemical analyses for the troublesome component at regular intervals throughout one complete treatment cycle. By regular intervals, we mean at regular increments of gallons treated, rather than time intervals, so as to compensate for any irregularties of flow.

You state that your softener has given satisfactory performance for several years. It seems possible, therefore, that some loss of zeolite has occurred over this period. This loss has reduced the number of gallons the water softener can treat between regenerations. Also, your analyses will show a rise in the concentration of the unwanted chemical toward the end of the cycle, though it may be within satisfactory limits for the maior part of the cycle.

Once this is established, the correction may be made immediately by reducing the number of gallons treated per cycle between regenerations. A more fundamental cure, of course, is to open the softener, carefully measure the depletion of the zeolite bed, and then add a sufficient amount of new zeolite material to restore the softener to its original capacity and efficiency.

Fortifying Peanut Butter

Question—Is there some practical way to enhance the nutritive value of peanut butter? We know that it is a good source of fat and of some proteins, but roasting seems to destroy most of the vitamins naturally present.

Answer—One promising approach to this problem has been investigated by the USDA. This is fortification of peanut butter with vitamin A, which, of course, is oil-soluble. This is a logical move, inasmuch as peanut butter is used to supplement butter or margarine, both of which contain this vitamin.

A method has been worked out experimentally to add the vitamin in a peanut oil solution of such concentration that the addition of 1% by weight of the finished product will produce a level of approximately 80 USP units per gram. (Synthetic vitamin A palmitate was used in these experiments.) At this level, a 1½-oz. serving would provide about half of the daily adult requirement of vitamin A.

To insure thorough and uniform mixing into the product, the method worked out was to add the oil solution to the nuts at the entry to the peanut-butter mill. Rate of oil addition must, of course, be closely controlled in order to maintain the vitamin content at a uniform level. This can be accomplished by using a small gear pump or a proportioning pump.

How Would You Do It?

Readers are invited to submit to FOOD ENGINEERING answers to question, "This Month's Problem." Selected answers will be published, with credit (unless you specify otherwise). We pay space rates.

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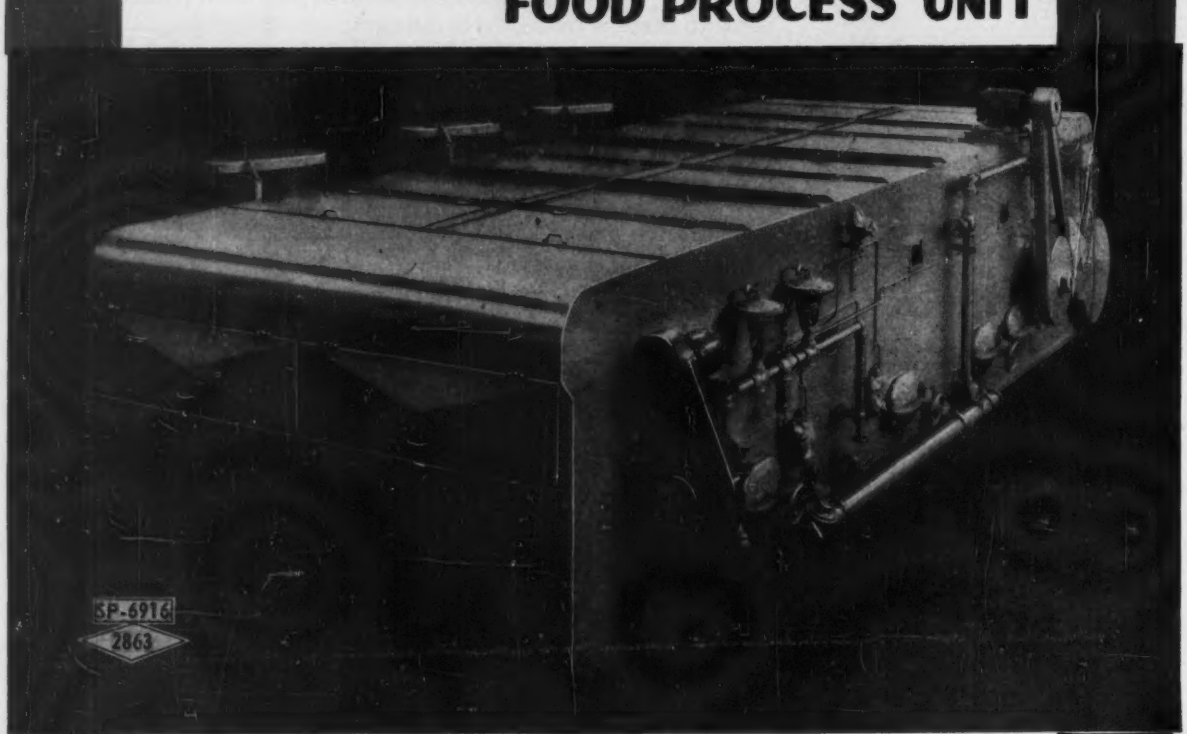
THE MEYER *Cataract* FOOD PROCESS UNIT



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A MEYER Cataract Food Process Unit is backed by 50 years experience in building efficient bottling equipment including Pasteurizers for the Brewing and other Beverage Industries and processing units for the grape Juice Industry.

The MEYER Cataract Food Process Unit is built for efficient processing. Food products may be cooled, heated or heated and cooled with the MEYER Food Process Unit at very high efficiency. The entire process of heating the product to a pre-determined temperature and/or a subsequent cooling, is accomplished within a single unit. It has proved highly efficient in a wide variety of applications, since 1939.

Designed to minimum floor space, feed at one end, discharge at the other end; also built in Multier design where floor space is limited.

The entire cooling or heating or heating and cooling operates on a continuous basis, under mechanical control. Product handling, waste water and labor requirements are minimized. Sanitary design provides for quick cleaning and visual inspection of all surfaces contacting the product packaged.

The MEYER Cataract Food Process Unit is designed for products in any and most forms of the prevailing size of glass or tin containers, likely to be adopted, from any diameter to 12½" high and particularly where one unit is to handle all types. Provisions can be made to handle containers of larger heights. Tell us of your requirements.

USED THE WORLD OVER — BOTTLING EQUIPMENT — 50

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It is interesting to note that assays made on the product over a shelf-life of several months showed very little loss of vitamin content. While an antioxidant can be added to the oil solution of the vitamin, if desired, the improvement does not appear to be sufficient to warrant it. There does not seem to be any serious problem as far as effect of temperature during milling is concerned.

Chili Con Carne Formula

Question — Can you furnish me with instructions on the preparation of chili con carne? We'd like to chub-package this product.

Answer—Grind, through ⅜-in. plate, 105 lb. of beef kidney suet along with 1½ oz. of garlic powder and 1½ lb. of onion powder. Cook, with constant agitation, ground ingredients in steam-jacket kettle. Then grind, through ⅜-in. plate, 195 lb. of lean, fresh beef. Add ground beef to cooked batch in kettle along with 7½ lb. of salt.

Continue cooking until meat becomes tender. Then, about ½ hr. before cooking is completed, add: California chili peppers (seeded and stemmed), 12 lb.; nutmeg, 6 oz.; paprika, 4½ lb.; coriander (ground), 18 oz.; oregano, 9 oz.; and cominos seed (toasted and ground), 1½ lb.

At this stage, turn off heat and, when fat rises to surface, add, with constant mixing, 24 lb. of soy flour. Cook additional 15 min. and add, with stirring, 3 gal. of tomato puree.

Cool to 118 deg. F. and load into a sausage-stuffing machine. Finally, stuff into casings, allow to set about 30 min. at room temperature, and harden in cooler.

Sulphuring Fruit

Question—I would be very grateful for receiving instruction on treating fresh strawberries and apple pulp with sulphur dioxide for commercial purposes. Can you also tell me how to manufacture apple pulp? What I'd particularly like to know is the minimum temperature to which the pulp must be cooled after sieving.

Answer—Strawberries for SO_2 preservation should be picked while fully firm or slightly green, graded for size, and freed of caps, stems, poor fruit, etc. After washing and draining, they may then be placed directly into barrels. Next, the barrel heads are replaced, and the preserving solution of SO_2 is added through the bung hole. Three gallons of solution, containing 3% sulphur dioxide, should be added to a 350-lb. barrel of strawberries, and

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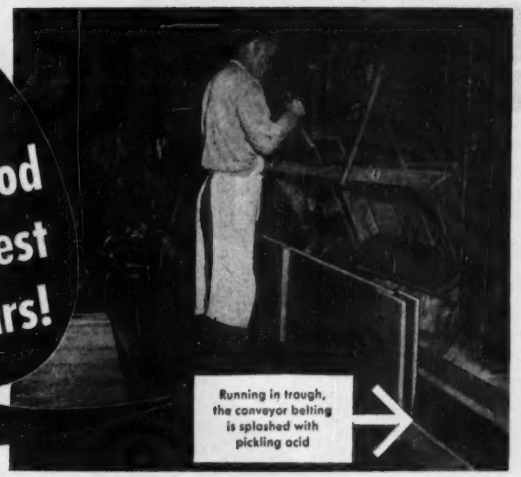

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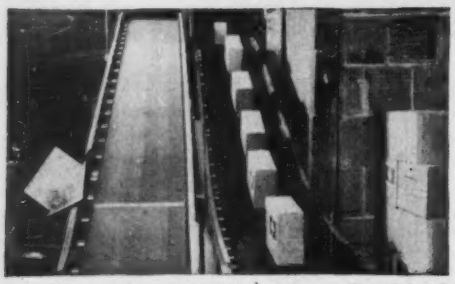

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each barrel should be immediately rolled several turns to distribute the solution. Each barrel should likewise be rolled one half turn each day for the first week.

Of the several possible ways of making the SO_2-solution, about the simplest is to use liquid SO_2 from a pressure cylinder mounted on a scale. From this cylinder, a flexible tube should be fed to the bottom of a tank containing a known amount of water. It is then an easy matter to admit enough preservative to the water to make the required strength solution. Often, this is made up to 3.5% to allow for evaporation losses.

Of course, the solution can also be made by dissolving proper quantities of a chemical such as sodium bisulphite or sodium sulphite in known amounts of water.

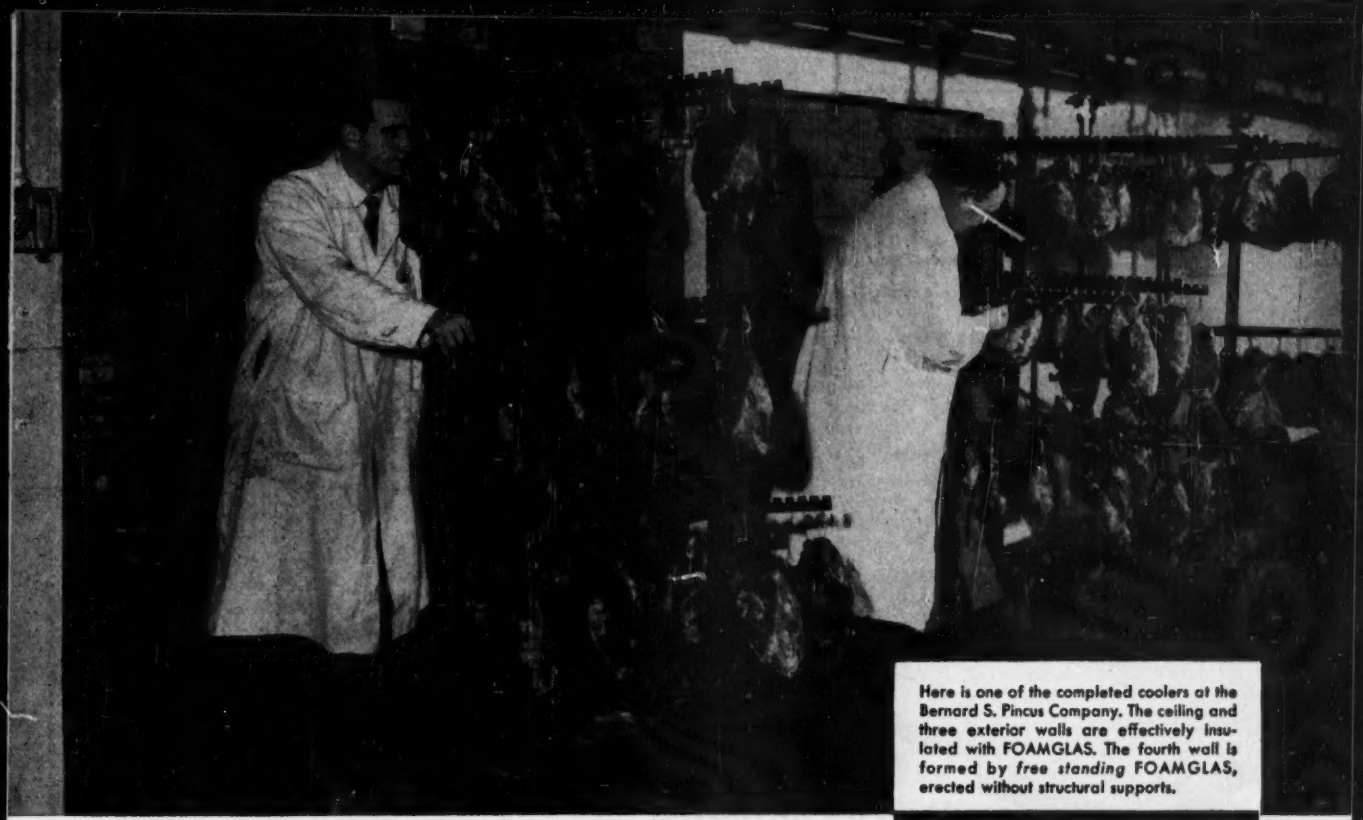
In the case of preserving apple pulp with SO_2, the method is essentially the same as described above, except that the solution is added at a rate of 1.4 gal. of 3% solution to a 350-lb. barrel of fruit. Also, it is best to add the solution to the barrel simultaneously with the pulp itself, or else mix it with the pulp in a separate tank before filling the barrels. The filled and sealed barrels should be rolled as described.

Q.—Can you tell me how to prepare and apply a white coating to our meat loaves? I do know this much: That the coating consists of gelatin, fat, and milk solids.

A.—Pour into silent cutter, 180 lb. of 200-deg. F. water and introduce 45 lb. of gelatin. Chop-mix batch until gelatin dissolves. Next add 90 lb. of fat (lard), and continue to chop-mix well. Finally add 60 lb. of milk solids (nonfat) together with 9 lb. of salt, and mix batch until temperature drops to about 100 F. As for dipping loaves, pour coating into steam-jacketed kettle and maintain at 100 F.

As to the manufacture of apple pulp, it is customary to cook the apple slices with a little water in steam-jacketed kettles sufficiently to soften them. The fruit is then pulped in a paddle or screw-type finisher, using screens of the desired perforation size to obtain the desired fineness of pulp. For example, screen perforations of 0.052-0.062 in. give a fairly coarse pulp.

We are not aware of any recommended minimum temperature for treatment of apple pulp with SO_2, and we don't believe refrigeration of the pulp would be required if the SO_2 solution were to be added with the



Here is one of the completed coolers at the Bernard S. Pincus Company. The ceiling and three exterior walls are effectively insulated with FOAMGLAS. The fourth wall is formed by *free standing* FOAMGLAS, erected without structural supports.

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Mr. Cooper concludes, "In addition our construction costs were cut by using FOAMGLAS. Its extra strength and rigidity enabled the use of free standing FOAMGLAS—without structural supports—for two interior walls."

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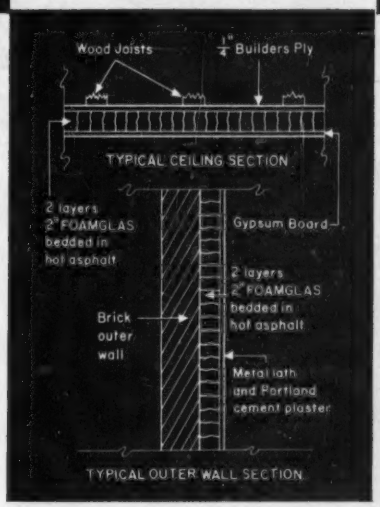
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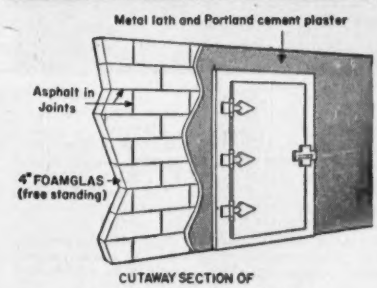

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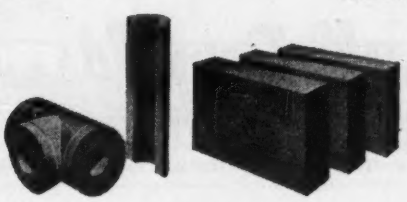

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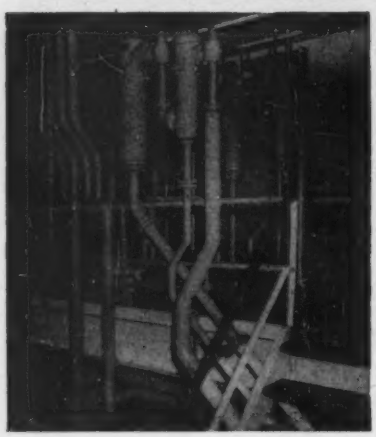

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pulp, and the barrels immediately sealed. However, there is no doubt that the gas is more soluble at lower temperatures, so it stands to reason that cooling would reduce the evaporation loss.

We suggest a jacketed screw conveyor, preferably one with a hollow screw and with cold well water circulating through screw and jacket. Or, if desired, a Votator could be used for cooling. The former might reduce the temperature to the region of 110-120 deg. F., while the latter would be even more efficient and should produce temperatures below 100 F. Too much cooling might tend to thicken the pulp making it difficult to secure proper mixing in the barrels by rolling.

In the case of either strawberries or apple pulp, it is recommended that the barrels be inspected and rolled once a month for the first six months, so that any leakers can be detected. It should also be remembered that the preservative solution is corrosive to the metal barrel hoops.

Some packers wishing to preserve the shape of strawberries (as for later use in preserves) find it desirable to incorporate a firming agent in the sulphur dioxide solution. This may be a calcium salt, and calcium carbonate at a concentration of 0.02% by weight is satisfactory.

Removing Foreign Matter

Question—*We pack top-quality peas and lima beans, but are finding it increasingly expensive to rid the raw materials of such foreign matter as nightshade berries, thistles, etc. Can you suggest any equipment which will make such separations more efficient than our present method of doing it manually with the aid of picking belts?*

Answer—There has recently been developed a cleaner for such separations as you mention, which makes use of a well-known principle adapted from the metallurgical industry. This principle is known as selective wetting, and the equipment is called a froth-flotation cleaner.

Incoming raw material is treated with an oil-in-water emulsion including a foaming agent in the pre-treatment section of the stainless steel equipment. Because of differences in "wetability", the undesired foreign matter separates from the product when the mixture is fed to the separating cone section. It then floats to the top as the product settles to the bottom.

Liquid is subsequently removed from both fractions by means of dewatering reels, and the reclaimed emulsion is recirculated for re-use.

This device is designed for ease of sanitation and utilizes a total of 11¼ hp. in a floor area of about 70 sq. ft. It cleans as much as 3 tons per hr. of lima beans or 4 tons per hr. of peas. It is claimed that with only one operator, this flotation cleaner can do the work of 20 or more workers using conventional sorting-belt methods.

Making Chocolate Donuts

Question—How will I go about making an approximate 30-lb. batch of chocolate donuts with a chocolate glaze?

Answer—Blend the following ingredients: Flour, 13 lb.; sugar, 5 lb.; shortening, 1 lb.; milk, 1 gal.; eggs, 2 fl. oz.; cocoa powder, 1 lb.; baking powder, ¼ lb.; vanilla, 2 oz.; salt, 2 oz.

Then fry batter at 375 deg. F., and coat with glaze made up with: gelatin, 3 oz. dissolved in a little water, powdered sugar, 20 lb.; corn syrup, 1 lb.; cocoa powder, 2 lb.; vanilla, 3 oz.; and sufficient water to thin.

On Parboiled Wheat

Question—Recently, we have heard of a wheat product which is supposed to have considerable potential export market, and we would like, if possible, to find out more about it. We believe it is called "burgul", or something of that sort. Can you provide any information on this?

Answer—Parboiled wheat, known as "boulgour" (with several other variations of the spelling was recently suggested as one possible outlet for the vast U. S. wheat surplus. This food product is said to be most popular in the Middle East, where it has been known and produced for centuries. Present interest lies in its unique properties, which have suggested its use in the heavily populated rice-consuming countries as a weapon against hunger.

Q.—For two years we've been attempting to bottle grape juice, but with unsatisfactory results. After several months, a whitish sediment forms in the bottles. Is there any way we can avoid this condition?

A.—It appears to us that you are not chilling the juice prior to bottling. As a result, cream of tartar is precipitating after bottling. We suggest you chill your juice close to the freezing point, hold at this temperature for about one month, filter, and then bottle.

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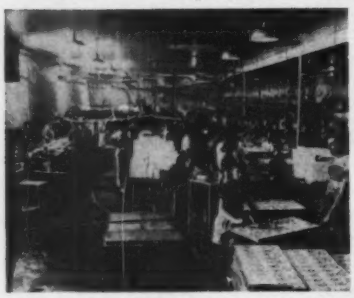

Above: View of the packaging end of the Ocoma production line.
Below: Three of the Frick refrigerating compressors at Ocoma Foods.

At the Poultry Processing Plant of the Ocoma Foods Company in Berryville, Arkansas. This recent addition to the rapidly expanding Ocoma Foods Company employs over 275 people, and incorporates all of the latest developments in production-line poultry processing.

Six Frick compressors supply the refrigeration necessary for the chilling, quick-freezing and cold storage phases of the process.

This is but one of hundreds of different applications of Frick refrigeration and air conditioning in the food industries.

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By boiling wheat kernels in as little water as possible (allowing complete absorption of water by grain and drying), a product is produced which not only retains the nutritional values—water-soluble minerals, vitamins, and proteins—but has unusual keeping properties. It is believed that this ancient process coats the kernels with a film having antioxidant (and possibly antibiotic) properties. It will keep fresh indefinitely, under storage conditions which would cause ordinary wheat to become musty or insect infested.

Another outstanding feature of this product is the way that it can be cooked with or without rice, or used to prepare dishes ordinarily made with rice.

It is our understanding that the USDA is experimenting with this product, and that modern methods of cooking and drying are being considered to replace the ancient method of preparation.

Formula for Polish Sausage

Question—Back in the September issue of FOOD ENGINEERING, *you had a very interesting story on a well-engineered plant making principally Polish sausage. However, nowhere in the story was there a formula or directions for manufacturing Polish sausage. Can you advise us how to make this product to extend our line?*

Answer—Grind, through ½-in. plate, 30 lb. of regular pork trimmings (lean) and 60 lb. of pork trimmings (extra lean). Also grind, but through ⅛-in. plate, 15 lb. of fresh pork cheek meat and 45 lb. of fresh boneless chucks (trimmed).

Blend meats in horizontal, batch-type mixer along with: Salt, 3¾ lb.; dextrose, 12 oz.; sodium nitrate, 8 oz.; sodium nitrite, ⅜ oz.; white pepper (ground), 9 oz.; garlic powder, ¾ oz.; coriander (ground), 3 oz.; and ice water, about 20-25 lb.

After about 3 min. of mixing, stuff into hog casings. When stuffing, puncture casings and then link. Hang product on racks and hold, to cure, over night in 38-deg. F. cooler. Next morning remove from cooler and keep at room temperature for about 3 hr. Load racked sausages into smokehouse. Gradually raise smokehouse temperature to 130 F. Then smoke 1 hr. at 150 F. and at 165 F. for another hour.

Following a 3-hr. smoke, remove sausages from smokehouse and cook at 160 F. for 5-10 min., depending upon size of casings. Finally, shower with cold water and mono-rail to cooler.

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For more information, use coupon on last page.

Useful New Books & Government Publications

Manual for Timestudy

TIMESTUDY FOR COST CONTROL. *Third Edition. By Phil Carroll. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 1954. 301 pages. 6¾ x 9¾ in., cloth. Price:* $5.00.

Primarily directed at aiding the engineer, plant executive, and supervisor, this book is a simple and practical guide to timestudy and control in plants where the motion picture method is not feasible.

It covers the selection of men for timestudy work, and the application of timestudy methods and data. Analyzing timestudy results, building standard data and data work sheets, getting incentive performance, and maintaining standards, are among the other topics dealt with.

Book is indexed.

British Food Industry

FOOD DIRECTORY 1954. *Published by Tothill Press Ltd., 33 Tothill St., London, S.W. 1, England. 1954. 476 pages. 5¾ x 8¼ in., cloth. Price:* £ 2 ($5.60).

An up-to-date guide to British food processors, the book also contains listings of equipment manufacturers, packaging materials and their manufacturers and suppliers. Information on food and packaging materials classification in Britain is present, along with a summary of overeas food standards and regulations, and tables of official permitted food colors.

A list of food consultants and British research organizations concludes the work.

Agricultural Yearbook

MARKETING. *Published by U. S. Dept. of Agriculture, Washington 25, D. C. 1954. 506 pages. 6 x 9¼ in., cloth. Price:* $1.25.

The work of 117 writers specializing in the marketing of agricultural produce, this comprehensive work contains chapters that are of interest to food processors.

Transportation and storage, processing, and grading are all covered, though not in great detail. Colorful charts and tables illustrate much of the book. Book is indexed.

Management Reports

THE TECHNICAL REPORT. *Edited by B. H. Weil. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, 1954. 485 pages. 6¾ x 9¾ in., cloth. Price:* $12.00.

The familiar forms of the technical report—progress report, formal report, market survey—are important to proper management functioning. The preparation of these reports is described in detail in this informative book. Illustrated and indexed, the book offers graphic advice to anyone faced with the problem of preparing, editing, distributing, filing, or assessing such reports.

Biochemistry Book

PRACTICAL PHYSIOLOGICAL CHEMISTRY. *By Philip B. Hawk, Bernard L. Oser, William H. Summerson. Published by Blakiston Co., Inc., 575 Madison Ave., New York 22. 1954. 1439 pages. 6¾ x 9¾ in., cloth. Price:* $12.00.

Now in its thirteenth edition, this authoritative text is offered with completely revamped chapters on nucleic acids, nucleoproteins, milk, and enzymes. Other chapters now include additional information, bringing them up to date.

Experimental, analytical, and preparative methods are thoroughly discussed in the light of recent advances. Of particular interest to chemist in the food industry are the chapters on carbohydrates, fats, proteins, and enzymes. The book is illustrated and indexed.

Flow and Transfer

CHEMICAL ENGINEERING, VOL I. *By J. M. Coulson and J. F. Richardson. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 1954. 370 pages. 6¾ × 9¾ in., cloth. Price:* $7.50

First in a series, this work covers fluid flow, heat transfer, mass transfer, and humidification. Treatment of each of these facets ranges from theory to practical examples.

The book is widely illustrated with charts, diagrams and tables. Each chapter is followed by a complete list of references. Book is indexed.

Reports to Management

Following booklets, published by Research Div., California Personnel Management Assn., Berkeley 4, Calif., are available at $1.00 per copy. They are paper bound and run from five to twelve pages in length.

WAGES AS COSTS. *(Report #180) A stenographic brief of an address by William S. Hopkins, University of Washington.*

MANAGEMENT RELATIONS WITH ORGANIZED LABOR *(Report #186) A transcript of an address by George M. Williams, Russell Mfg. Co.*

FE REPRINTS AVAILABLE

Difficult-to-find practical information on food plant operations and materials is available in the "roundup" reports and articles listed below. Single-copy reprint prices are given. For orders of 20 or more, there is a 25% discount. You order the reprints by circling the corresponding numbers on the Reader Service Coupon, inside the back cover. You will be billed when your order is filled.

8. Newer Ingredients $1.25

Twenty-page report on the newer ingredients which aid in producing better food products (May, 1952). It includes detailed articles on these subjects: (1) Guide to Optional "Chemical" Additives. (2) Antioxidants Provide New Flavor Controls. (3) Industrial Enzymes Now Speed Natural Processes. (4) Food Emulsifiers Bring New Highs in Uniformity. (5) Seaweed Extractives Find Versatile Uses in Foods.

9. Quality Control $0.75

Nine-page report on simplified statistical quality control for practical food product improvement (Dec., 1952). New reference-table method is presented. It shortcuts complex mathematics of statistical technique, is especially suited to food plant operations.

10. Packaging Materials $1.00

Sixteen-page report on how to get better production-line performance with packaging materials and containers (March, 1952). It includes these comprehensive articles: (1) Developing Your Package for High Output. (2) How Properties of Materials Affect Packaging Speeds. (3) Nipping Production Slowdowns by Pre-Checking Supplies. (4) Tips on Ordering Materials for Top Performance. (5) Proper Storage of Your Stock Averts Line Headaches.

11. Sanitation $0.50

Six-page report on "How To Assure Top Sanitation in Your Processing Equipment" (Jan., 1952). This report was a preprint of one section of a practical book on food plant sanitation prepared by Association of Food Industry Sanitarians.

12. Materials Handling $1.00

Twelve-page report entitled "How Modern Materials Handling Gives New Spurt in Processing" (March, 1951). Case histories of important savings through more efficient handling are presented. And the different types of handling equipment are described and illustrated.

13. Mixing $0.50

Four-page roundup of progress in plant mixing methods and equipment, plus a forecast of what is ahead (Oct., 1953). Performance data are included as yardsticks of what can be achieved.

14. Centrifuging $1.00

Twelve-page report on "Centrifuging's Big Strides in Food Processing" (Dec., 1950). Different types of centrifuges are described and illustrated, and the applications to which each type is best suited are delineated.

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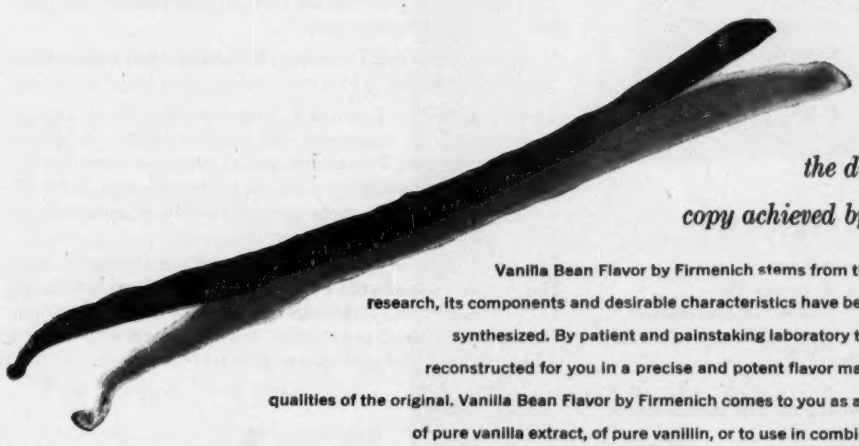

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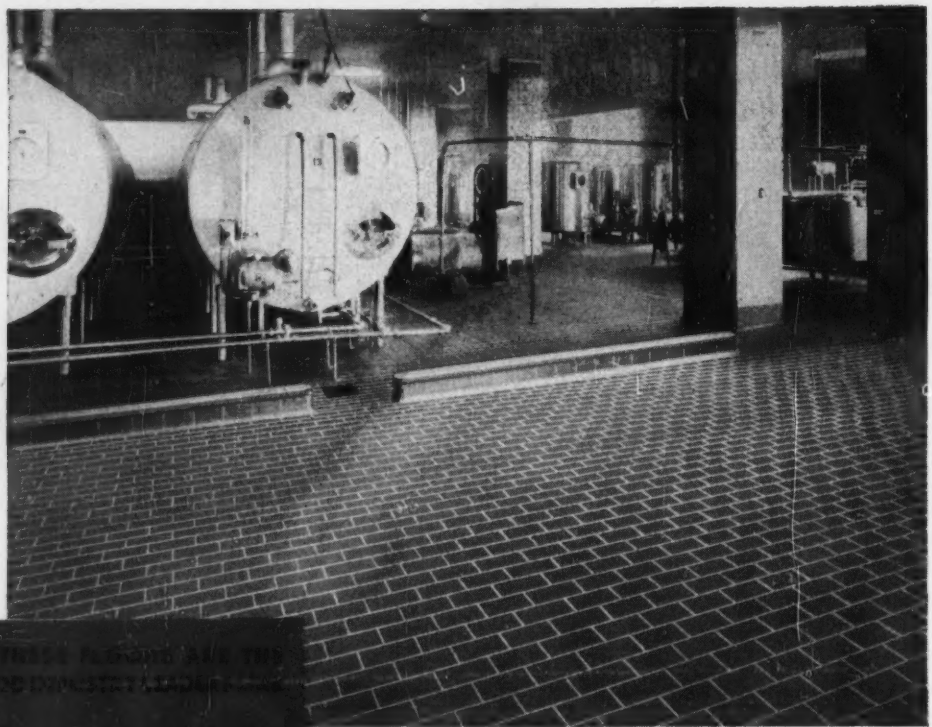

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Technical News • Washington Highlights • Economic Trends • Labor Developments

Film Wraps vs. Insects

Fourteen different kinds of film packaging materials have now been tested by U. of California scientists to determine their resistance to insect penetration.

Working at the institution's Citrus Experiment Station with 11 common varieties of insects, researchers reported that "nontransparent laminated film containing aluminum foil was relatively resistant to insect penetration but not insect-proof."

"Of the transparent laminated films, a combination of saran and pliofilm proved most resistant. Cellophane, no matter how thick, was easily penetrated, and the resistance of polyethylene film varied directly with film thickness."

Speeds Tomato Ripening

Ethylene gas, says USDA, may be used to reduce by a third to a half the time normally required to ripen tomatoes for prepackaging.

The acceleration technique consists of gasing tomatoes with 1 part ethylene to 5,000 parts air daily, for 4 or 5 days, in closed storage where temperatures are held at 68-70 deg. F.

For a few minutes daily, prior to application of the gas, the storage room is ventilated to prevent oxygen depletion and CO_2 accumulation.

Detects Infected Eggs

An electronic device that spots early stages of "green rot" in eggs and discards the infected ones has been developed by USDA scientists.

Technique hinges on fact that facteria in rot-infected eggs produce a chemical that fluoresces green under ultraviolet light. So u-v beams are passed through eggs, and then tell-tale green wavelengths spark an electronic reject action.

"Pre-Trayed" Lettuce

In a new technique for wrapping lettuce, developed by Triple-M Pack Corp., Philadelphia, a colored, folded paperboard tray (Standard Folding Trays Corp., N.Y.C.) is employed.

Tray "cradles" heads, permitting their uniform flow through machines that film-wrap and seal. In addition, tray unit guards lettuce from heat.

Consumers Spend Record $64 Billion; New Items Cited; Sales Efforts Vital

A total of $64 billion is being chalked up as the American consumers' striking overall outlay for food in '54, according to Paul Willis, president of Grocery Manufacturers of America, who keynoted the group's recent meeting in New York City.

► **This is a full $1 billion over the figure run up in '53.** A specific rise in products sold is represented in the total, he said, since prices have remained about the same.

Development of new items and better promotion were then cited as sparking the increase. But Mr. Willis added that he sees an emphatic need for augmented sales effort.

A number of factors are at work. For one thing, food industry's capital investment per worker has widened away from all-manufacturing—$7,500 against $6,000 in '39, and now $16,500 against $12,500. Further, is the portion of the population represented—with 30% of the people earning their income directly or indirectly from the food industry. GMA's sampling of 89 food firms puts '53 average profit per dollar of sales at 2.5c.

Whereas specific grocery store sales totaled about $10 billion in '39, they are now reaching around $42 billion. Great influence has been the abundance of new products and their variety. Few retailers of ten years ago would have believed they would be handling 2,500 additional items by '54, said Mr. Willis. And certainly the wholesaler had no pre-concept of a 7,000-odd "up" in products.

Relative to items, James Cooke, vice-president of Penn Fruit Co., Philadelphia, said that whereas his company had carried some 1,500 products in 1933, today it counted fully 4,900. And he saw the list growing.

"Distribution Centers": Mr. Willis revealed that grocery manufacturers are studying the idea of privately financed distribution centers in major markets to permit more efficient and economical movement of goods through advanced techniques such as automatic placement of all routine orders.

Elections: In GMA voting, Paul Willis was re-elected as president, while Paul Gerot, president of Pills-

This Is 45,000,000,000th

—can delivered for packing of Wisconsin food products! Mounted in plastic on commemorative plaque, it is received for Governor Walter Kohler by Donald McDowell (left), director of the Badger State's Department of Agriculture. The presentation is being made by Richard Hipke (right), president of Wisconsin Canners Assn., and participatting (center, l. to r.) are: William Stolk, president of American Can Co., and Rudolph Froker, dean, College of Agriculture, U. of Wisconsin.

What Will Democratic Congress Do? Here's Picture as 84th Looms–

Rise of the Democrats to power in Congress makes some real difference to the food industry.

And for the Food & Drug Administration, it may mean an expansion of activities. The agency suffered more than a 10% cut in funds below what President Eisenhower asked during the past two years of Old-Guard Republican control of the purse strings.

Chairmanships: In particular, the party switch brings into key chairmanships new men who take different views. Further, the people voted out some Congressmen and Senators who had specifically influenced legislation.

Perhaps the most important man on "The Hill", as far as food and drug legislation is concerned, will be Tennessee Rep. Percy Priest. He is slated to take over from New Jersey's Charles Wolverton as chairman of the House Interstate & Foreign Commerce Committee, which is primarily concerned with food additives, food and drug matters in general, and some aspects of water pollution control.

A liberal Democrat, Priest has been one of his party's top strategists. In recent action he was Democratic whip.

On the Senate side, Democrat Lister Hill of Alabama, also a liberal, will chairman the Labor & Public Welfare Committee, which handles Senate food and drug legislation. On such matters, Senate committees usually accept pretty much the provisions of bills as they pass the House.

FDA Aspects: It will be remembered that John Taber (N. Y.) and Fred E. Busbey (Ill.)–chairmen, respectively, of the House Appropriations Committee and its subcommittee on Health-Education-Welfare — successfully fought to cutback FDA factory-inspection funds. Busbey was defeated Nov. 2, while Taber will resume as ranking minority member of the committee. H-E-W subcommittee chairman will be John Fogarty (R. I.), who has shown a strong inclination to give FDA all the money it has sought.

Taxes: True, you can expect opposition to further tax breaks for business–but the Democrats certainly won't propose repeal of the tax revision bill Republicans passed this year. The Democrats will specifically be inclined to favor tax relief to the consumer.

Democrats in general will be inclined to support the Treasury's expected request for a continuation of the present 52% corporate income rate, which has been due to drop to 47% next year.

On Agriculture, look for the Democrats to talk up a return to mandatory 90%-of-parity price supports. However, no real drive to achieve this is very likely next year. For instance, despite their good showing in the dairy states, Democrats haven't notably promoted raising of butter-price supports from 75% back to 90%.

Fact that Republicans did about as well as Democrats in controversial farm area elections is interpreted as a victory for Secretary Benson and the Administration's position on sliding-scale price supports. Certainly, the election proved that all-out advocacy of mandatory 90% supports was no guarantee of victory in farm states.

For the next two years you can expect a search by the Democrats for new political positions to counter Republican backing of the sliding scale. One possibility is a resurgence of the so-called Brannan plan–calling for production payments to boost the farmer's income to a specified parity level, while his crops, meanwhile, would bring whatever the market price dictates. Such plans are now operating for both sugar beets and for wool.

bury Mills, was named first vice-president.

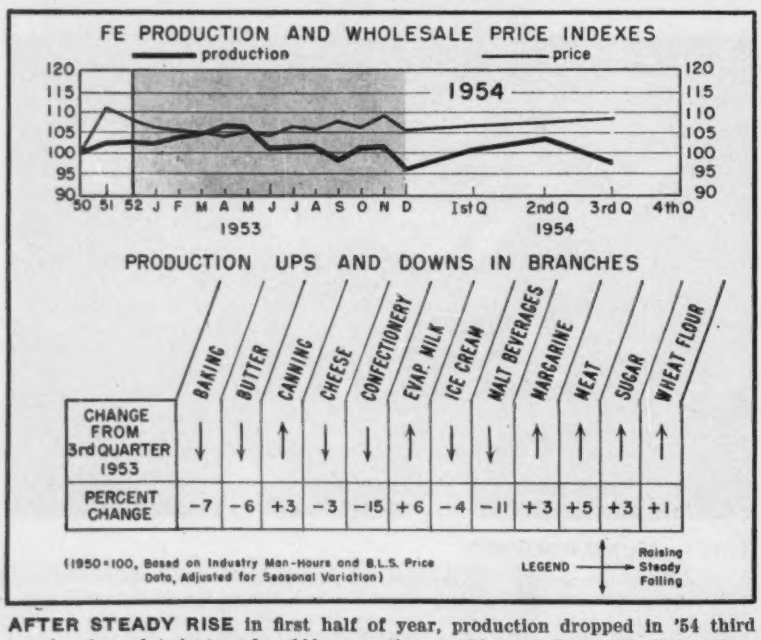
Post of second v.-p. went to W. Vanderploeg, president of Kellogg Co., and Walter Shafer, vice-president of Armour & Co., was selected as third v.-p.

Re-elected to their respective positions of secretary and treasurer were William Dolan, president of Wilbert Products Co., and B. Snyder, vice-chairman of the Board of H. B. Davis Co.

Canners' Space Sold Out

Demands for exhibit space at the annual Canners' Show—slated Feb. 19-23 at Chicago's Conrad Hilton Hotel—arrived in such early flood that the full 42,000 sq. ft. already had been allocated last month.

Thus, W. D. Lewis, Exhibit Manager and Secretary-Treasurer of the Canning Machinery & Supplies Assn., has had to place all later requests for space on a waiting-list basis.



AFTER STEADY RISE in first half of year, production dropped in '54 third quarter to point just under 100, repeating position of Sept. '53. Price line, however, continued its long, slow climb.

Frozen Strawberry Juice

Problem of how to use small, misshapen, or blemished strawberries can be solved by making them into frozen strawberry juice concentrate.

The process, developed by USDA scientists at Western Regional Research Laboratory, Albany, Calif., is stated to produce a sparkling, clear concentrate (up to 12-fold) that is stable and won't gel. This can be used not only in jelly making but also as a flavoring constituent for sherbet, candies, or beverages.

Method is similar to that for preparing frozen apple juice concentrate —recovering of volatile essences from depectinized and clarified juice and returning recovered essences to the concentrate.

Launches Frontal Attack On Cocoa Bean Problem

American Cocoa Institute has joined with Point Four technicians and local governments in a much-needed long-range program to encourage cultivation of disease-resistant cocoa bean trees in Central America.

Impetus has been the sharp rise in cocoa bean prices from 40 to 70c.—a blow to chocolate processors. It is pointed out that the plant virus has steadily cut world production.

Meanwhile, demand for chocolate products is up, yet an even lower cocoa bean supply is forecast for 1954-55.

To cordinate the program for all of Central America, the Institute has set up an extensive plantation in Costa Rica for disease control and plant improvement.

Hors d'Oeuvres

▶ Dill pickles, with napkins, are sold in three Ponca City, Okla., theaters. One movie moves 100-gal. a month. The pickles probably help the people to stomach the film fare.

▶ **Medical researchers report that four bottles of beer daily help patients with heart disease. The brew contains food value, but no salt. Therefore it has no sodium to promote water logging of lung tissue and consequent heart congestion. Nice to be able to enjoy an illness.**

▶ An hour's work today gets you about twice as much milk, lamb, and ham as in 1929. And with food so relatively cheap, there is more pleasure in eating it.

▶ **Instant bread mix has been developed by the Canadian Defense Research Board. Just add water and bake. No kneading, no fermentation—no business for the bread bakeries.**

▶ A year-end promotion theme is to be "Holidays are pickle days." And with no "d" on "pickle."

▶ **The Marines ate cake on the occasion of the Corps' 179th anniversary. Our powerful nuclear weapons must be making them soft.**

▶ Countries behind the Iron Curtain happily accepted relief food shipments from the United States. Now they'll try to bite the hand that fed them.

▶ **Campbell Soup has let the public in on an 85-year-old "secret"—the fact that the company makes money. Sales for the past fiscal year were $338,667,888; profits, $23,563,257. Hardly comes as a surprise.**

▶ German experimenters have ultrasonically speeded the removal and disintegration of bottle labels. Sooner or later noiseless sound is going to make itself heard in American food factories.

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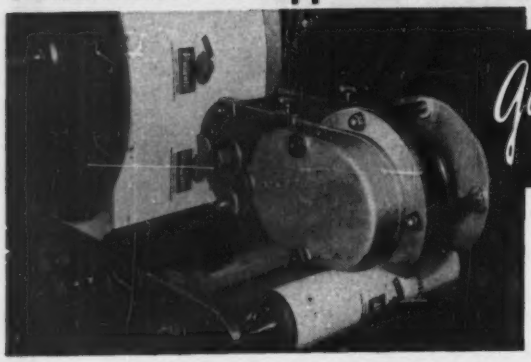

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Demand, Output Stay High, Prices to Drop—USDA

Customer demand and farm output should continue high. That's how top officials of USDA sized up the situation in their recent outlook conference.

▶ **Food prices, they predict, will be lower in '55.**

Product by product, here's the way they see the new year:

Dairy products—Total milk output of about 124 billion pounds. This is slightly higher than '54.

Butter & Cheese—Production down a bit, affected by release of CCC holdings.

Fruits—Frozen varieties and juices in larger supply, exceeding customer demand. Canned fruits less plentiful.

Vegetables—Due to reduced crops, supplies of fresh, frozen, and canned vegetables are seen shorter until mid-'55.

Poultry & Eggs—Up in '55.

Fishery products—Lower prices loom because of increased competition from red meats.

Meats—Beef consumption should remain near record '54 figure. Supplies down very slightly. Pork consumption and supply figured to be somewhat up, but prices down. Veal also slightly up.

Cereals—Supplies increased in rye, barley, rice, and oats. Wheat about the same as in '54. Corn falling off.

Tech Sessions Feature Record Dairy Show

More than 25,000 dairy people viewed products and equipment displayed by 363 exhibitors at the recent 19th Dairy Industries Exposition in Atlantic City. Held jointly with conventions of the Milk Industry Foundation and International Assn. of Ice Cream Manufacturers, the full-week gathering featured general and technical sessions for dealers and processors.

Tech sessions were broken down for most thorough exploration of serious problems. MIF's six sessions concerned: Plant operations, laboratory, milk supplies, motor vehicles, sales and merchandising, and accounting. IAICM sessions were devoted to: Production and laboratory problems, accounting, and merchandising.

A highlight was the Dairy Products Judging Contest between teams from 26 land-grant colleges.

Winner and recipient of a $1,380 fellowship grant and the All Products Bowl was the Kansas State College team. Second was Mississippi State College ($1,280 fellowship) and third was Texas Tech ($1,180 fellowship). A new one-time fourth grant of $900 went to the U. of Tennessee.

Fla. Orange Juice Rockets

This year's Florida orange crop is estimated to be running to a record 96 million boxes—up about 5 million from '53.

And it will produce more juice, says General Manager R. Rutledge, of Florida Citrus Mutual, Lakeland, with the expected-yield figure hiked to 1.39 gal. of concentrate per box as against 1.25 last year.

This would sum up to 71 million gallons of frozen concentrate as compared with 65½ million from the '53 season.. And it would go on top of an approximate 10-million-gallon carryover.

Of total boxes, at least 26½ million will go to market as fresh oranges, some 3½ to local sales and gift packages, and 2 to hot-pack concentrates and frozen blends.

Maintenance Show Slates Food Plant Roundtable

The food industry is among five industries that will be specially distinguished in the Plant Maintenance & Engineering Conference & Show scheduled in Chicago next month.

Conference sessions (International Amphitheatre during day, Palmer House at night) will see 53 speakers in action Jan. 24-26. The exposition will run concurrently in the Amphitheatre, then continue through Jan. 27. It is stated that more than 10,000 items of equipment will be on view.

The "Maintenance in Food Plants" roundtable (8-10 P.M., Jan. 25) will be directed by J. S. Hutchison, chief engineering of Exchange Lemon Products Co., Corona, Calif.

Human relations will get attention in two of three general sessions. Also to be encompassed are such subjects as buildings, sanitation, electronic controls, lighting, corrosion, power, lubrication, safety, and materials handling.

Conference chairman is L. C. Morrow, consulting editor of McGraw-Hill's *Factory Management & Maintenance.*

Corrections

In the article "Cheese Keeps Longer in Antimycotic Wrapper" (FE Oct.) the lettered identifications of the graph lines (p. 94) were inadvertently transposed. The lower curve in each chart (rather than the upper) should have been identified as "Wrapper Containing Antimycotic," while the upper curve in each actually represented the "Control Wrapper."

A typographical error appeared in the Nov. FE article "Mixing in Vacuum Ups Product Quality." A statement under the subheading "Cooking Described" (p. 166) read: "Spaghetti, 18 oz., was placed in 2 qt of boiling tap water containing 1% salt." The amount of spaghetti should have been printed as "8 oz."—*The Editors*

Technologists Must Study Methods If They Want Big Pay

It is not enough for a food technologist to know what must be done to a food in processing. He also should know *how* it is done—if he wants to earn a salary well into the five-figure class.

That was the significant keynote of a pointed talk on unit operations and food engineering made by Dr. Laurence V. Burton, executive director of Packaging Institute and formerly editor of *Food Industries*, at the November meeting of the New York Section, Institute of Food Technologists.

And the hope is that someday all food factories will be managed by food technologists or food engineers, Dr. Burton said.

Defining the different technical food functions, the speaker observed that science arises from laboratory investigations, engineering applies that knowledge in factory operations, and in between is the technologist who uses food science to develop processes.

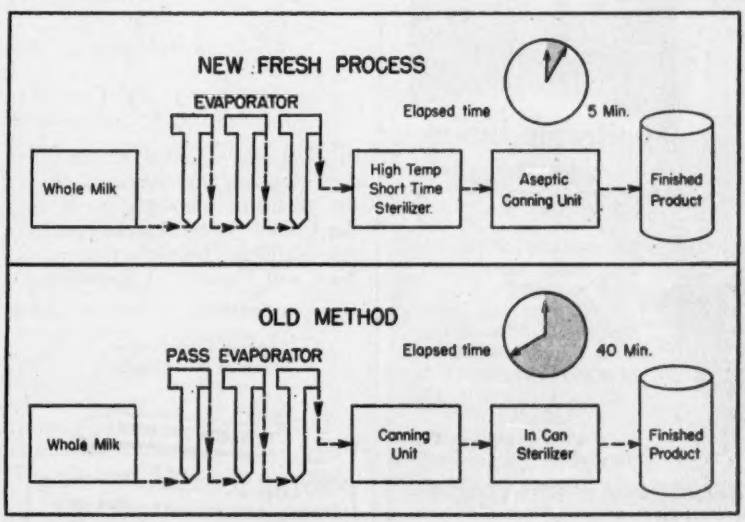
But the engineer makes the processes work to produce products of the desired quality at a profitable manufacturing cost. And the engineer was further defined as a man who can do for $1 what any fool can do for $3.

Dr. Burton strongly emphasized that the methods used in processing one type of food product are not basically different from those employed for an entirely different type of food. In fact, there are only 10 or 15 methods that can be used in food factories. These are the basic, or unit, operations and processes such as separating, disintegrating, mixing, heat transfer, forming, packaging, materials handling, fermenting, hydrolyzing, and coagulating.

And technologists should study closely the machines employed in food processing because of the possible effects on the product. An example is the low-temperature vacuum concentrators for heat-sensitive orange juice. By studying the various machines and methods, technologists can find ways to produce the same result at lower cost.

The tendency of food factory operators to overlook disproportionately high packaging costs also was stressed. A bakery was cited as an example. In this particular plant, visited by the speaker, three men were producing rolls—23 workers were packaging them. About 88% of the labor force was engaged in packaging.

This disproportionate arrangement had never been "noticed" by the plant management—because that's the way it always had been done. But when attention was called to the percentages, management realized the need, and the opportunity, for cutting packaging costs.



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Briefly . . .

• CAMPBELL SOUP CO.'s financial aspects are initially reported in connection with a statement relative to proposed public sale of a block of stock. Firm's resources now run to $223 million. And it has rocketed from 1938-39 net sales of $65 million and net income of $11 million up to 1953-54 figures of $338 million and $23 million.

• A PLASTIC SEE-THRU CAN has been devised in Germany, says UN's "World Fisheries Abstracts." Reportedly, it can be sealed hermetically and will withstand heating up to 356 deg. F.

• USDA SECRETARY BENSON's new executive assistant Milan D. Smith, has now taken office. Formerly with Smith Frozen Foods, he most recently has been director of the National Assn. of Frozen Food Packers. He succeeds Lorenzo Hoopes, who returns to Lucerne Milk Div. of Safeway Stores.

• FISH STICK output for the year is figured to hit a walloping 50 million pounds instead of the 40 million originally estimated.

• COOKING OIL FLAVOR is found improved and also preserved by addition of two new chemicals in mere 0.005% amounts. Designated as Mecsa and Metsa, the compounds were discovered by Drs. A. Schwab and C. Evans at Northern Utilization Research Branch, USDA. They are stated to inhibit effects of oxygen from the air. Mecsa and Metsa, are, respectively, mono-octadecyl esters carboxymethylmercapto-succinic acid and thiousuccinic acid.

• ATOMIC RADIATION needed to sterilize foods may come to be gaged by a low-cost "dog-tag" type of dosimeter developed at the Naval Research Laboratory. Device comprises a special glass that changes color relative to intensity of the rays to which it is exposed.

USDA & FDA Standards

Recent Government-agency actions affecting the food industry include the following. References are to issues of the *Federal Register*.

Poultry and Poultry Products, revision of inspection application rules, F.R. Oct. 14, p. 6601 (USDA).

Potatoes, Frozen French Frieds, new grade standards, F.R. Oct. 20, p. 6723 (USDA).

Grape Juice, Frozen Concentrate, proposed new standards, F.R. Oct. 20, p. 6773 (USDA).

Fruits and Vegetables, FDA proposed tolerance levels for pesticides, F.R. Oct. 20, pp. 6733, 6738.

Lettuce, revised grade standards, F.R. Oct. 27, p. 6878 (USDA).

Apples, Dried, deadline for submission of views on proposed revision of standards F.R. Aug. 18, p. 5222, extended to Mar. 1, '55 (USDA).

Vegetables, 43 Canned Varieties, revision of FDA standards of identity to allow use of monosodium glutamate as optional ingredient, *F.R.* Nov. 6, p. 7228.

Corn Millers Elect

Following new officers were named by American Corn Millers Federation:

President, Robert C. Miner, Mine Hillard Milling Co., Wilkes-Barre, Pa.; First Vice-President, Fred L. King, Patent Cereals Co., Geneva, N. Y.; Second V.-P., Leslie A. Ford, Shawnee Milling Co., Shawnee, Okla.; and Treasurer, M. F. Lynch, Quaker Oats Co., Chicago.

Schedule of Events

January '55

9–11—Northwest Frozen Foods Assn.; Olympic Hotel, Seattle.
12–13—Northwest Canners Assn., annual convention; Olympic Hotel, Seattle.
18–20—Annual Workshop for Food Processors; U. of Maryland, College Park.
24–26—National Dairy Council, mid-winter conference; La Salle Hotel, Chicago.
24–27—American Management Assn., general management conference; Hotel Statler, Los Angeles.
24–27—National Potato Chip Institute, annual conference; Sherman Hotel, Chicago.
24–27—Plant Maintenance & Engineering Conference (24-26) and Show (24-27); International Amphitheatre and Palmer House, respectively, Chicago.
27—Dairy Products Improvement Institute, annual meeting; Hotel Commodore, New York City.
31–F3—United Fresh Fruit & Vegetable Assn.; Hotel Commodore, New York City.

February

2—Eastern Frosted Foods Assn.; Belmont-Plaza Hotel, New York City.
3–4—Western Frozen Food Processors Assn.; Hotel Senator, Sacramento, Calif.
5–20—Package Designers Council, 1954 Packaging Competition, exhibit and presentation of awards; American Institute of Graphic Arts, N. Y. C.
6–8—Tri-State Bakers Assn.; Jung Hotel, New Orleans.
7–8—Grain Processing Machinery Mfrs. Assn.; Edgewater Beach Hotel, Chicago.
11–13—Institute of American Poultry Industries, annual conference; Kansas City, Mo.
14–16—American Management Assn., personnel conference; Palmer House, Chicago.
15–18—Western States Meat Packers Assn., annual meeting; Palace Hotel, San Francisco.
16—National Red Cherry Institute, annual meeting; Morrison Hotel, Chicago.
18—National Pickle Packers Assn., winter meeting; Drake Hotel, Chicago.
19–23—National Canners Assn., National Food Brokers, Canning Machinery & Supplies Assn., overall convention and annual meetings; Conrad Hilton Hotel, Chicago.
21–27—International Food Show; Kingsbridge Armory, New York City.

Productive Maintenance

—*Continued from page 115*

overhaul is to be carried out, when consideration should also be given to simultaneous reconditioning of dependent or secondary equipment. In other words, overhaul should not be thought of by machine, but rather by manufacturing operation.

One of the objectives of the planned overhaul program is to maintain the average age of the windings of all electrical equipment at a predetermined number of years. This helps prevent a situation where the maintenance supervisor suddenly wakes up to the fact that nearly all of his critical machines are operating on borrowed time.

In summary, you have seen the five vital steps in a PM program, and have learned the working fundamentals.

They do not tell you how to set up a complete maintenance plan; several additional steps are required for this. But such steps are not as imperative as the ones already discussed. The following brief analysis of these extra steps is simply an outline:

Budgeting

A well-controlled budget is essential to a successful operation. Dollars needed for the various phases of maintenance can never be projected with 100% accuracy. It is always necessary to maintain a certain amount of flexibility. A major breakdown will result in the over-spending of the budgeted amount for "unpredictable work." In a case such as this, it will be necessary to reduce the amounts allocated for other activities.

By putting the overall requirements and benefits before management—clearly, concisely, and graphically—you can present your request for working dollars with considerable assurance of success. Also, management is placed in the position of either accepting your recommendations or assuming a part of the responsibility for future breakdowns.

When you think of how the best, most efficient and most economical job of maintenance can be done, through organization and assignment of responsibility, keep this primary thought in mind.

Basic objective is to attain a condition of maintaining equipment and anticipating and eliminating trouble at least cost.

PM will be supported by management only when it can gage performance. Management regularly receives reports on production performance. Reports covering maintenance are more difficult—the better the job done in preventing trouble, the less there is to report.

The only thing that can be done is to report activity and let the continuity of operation of the production equipment determine the efficiency of the maintenance operation.

Employee Training

Will it pay you to have a training program? The answer is usually "Yes." Here is why: As equipment has become more complicated, craft specialization increases. A plant can benefit by having specialists maintain the equipment. But there can be the usual drawbacks common to specialization.

Having representatives of your suppliers lead training discussions should be considered. They are usually only too glad to do so—not only do they want to demonstrate the quality of their equipment, but they know that proper maintenance will result in a better record for their equipment.

Above article was drafted from the General Electric Co.'s recent special presentation and color film showing at the McGraw-Hill Publishing Co., New York City. GE further has put this material into a brochure titled, "5 Steps to Productvie Maintenance."

End (Resume reading on page 116)

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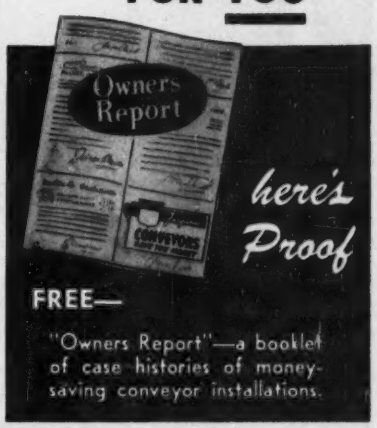

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Lasagna Formed With Elongated, Ribbed Strands of Macaroni Paste —*S. La Rosa to V. La Rosa & Sons, Brooklyn, N. Y. No. 2,686,720. Aug. 17, 1954.*

Skin-Free Peanuts by Grading Nuts, Increasing Moisture to 20%, Drying to 9%, Blanching—*E. L. D'Aquin, J. Pominski, and H. L. E. Vix, New Orleans, L. J. Molaison, Gretna, La. to USA. No. 2,687,155. Aug. 24, 1954.*

Soluble Coffee Concentrate by Extracting Roasted Coffee, Hydrolyzing Grounds, Separating, Neutralizing Hydrolyzate, Combining With Extract, Drying—*F. C. Benner, Waltham and A. Di Nardo, Jamaica Plain to National Research Corp., Cambridge, Mass. No. 2,687,355. Aug. 24, 1954.*

Cocoa Butter and Fat-Free Flavoring From Cocoa Beans by Gelatinizing Insoluble Starch, Saccharifying With Enzyme, Coagulating Proteins, Separating—*A. E. Siehrs to Krim-Ko Corp., Chicago. No. 2,687,959. Aug. 31, 1954.*

Prepared Flour Mix With Precooked Sweet Potatoes—*R. C. Sharp, San Francisco. No. 2,687,960. Aug. 31.*

Glutamic Acid From Steffen's Filtrate by Acidifying, Separating Solids, Hydrolyzing, Neutralizing, Reseparating, Crystallizing—*F. A. Hoglan, Toledo, Ohio to International Minerals & Chemical Corp. No. 2,688,037. Aug. 31, 1954.*

Moisture-Resistant Baked Goods From Batter Having Shortening Incorporated as Stabilized Aqueous Emulsion—*S. C. Graham to Illinois Development Laboratories, Chicago. No. 2,688,551. Sept. 7, 1954.*

Liquid Cheese Composition Containing Water, Comminuted Cured and/or Pasteurized Cheese, Hexahydric Alcohol—*G. C. Schicks, Upper Montclair and E. F. Klein to Geed, Inc., Perth Amboy, N. J. No. 2,688,553. Sept. 7, 1954.*

PROCESSES

Determining Moisture in Viscous Materials by Distributing Sample Between Glass Plates, Weighing, Heating, Reweighing—*W. Heidbuink, Memmingerberg, Germany. No. 2,687,039. Aug. 24, 1954.*

Fish Processing and Curing by Cleaning, Comminuting, Adding Preservatives—*P. Fraticelli to Sealady Seafood Corp., Boston, Mass. No. 2,687,356. Aug. 24, 1954.*

Rodenticide Composition by Spraying Cereal Grain With Ethanol Solution of 3-(acetonyl)-4-hydroxycoumarin, Drying, Spraying With Mineral Oil, Corn Syrup Solution, Drying—*K. P. Link, Middleton, Wis. to The d-Con Co., Inc., Chicago. No. 2,687,365. Aug. 24. 1954.*

Decontaminating Waste Liquids by Percolating Through Aggregated Soil, Treated With Synthetic Resin—*D. T. Mowry and R. M. Hedrick, Dayton, Ohio to Monsanto Chemical Co., St. Louis, Mo. No. 2,687,374. Aug. 24, 1954.*

Feeding Dough Into Gap Between Smooth-Surfaced Rolls to Form Continuous Thin Sheet—*E. T. Oakes to E. T. Oakes Corp., Douglaston, N. Y. No. 2,687,699. Aug. 31, 1954.*

Separating Impurities From Corn by Feeding Thin Stream Between Rotary Conveying and Stationary Electrodes Charged With 20-40,000 v.—*H. B. Johnson, Rochester, N. Y. to Quaker Oats Co., Chicago. No. 2,687,803. Aug. 31, 1954.*

Injecting Uncooked Fowl With Salt of Glutamic Acid in Aqueous Gelling Agent at Superatmospheric Temperature—*E. D. Ellis, Miami, Fla. to International Minerals & Chemical Corp. No. 2,687,961. Aug. 31, 1954.*

EQUIPMENT

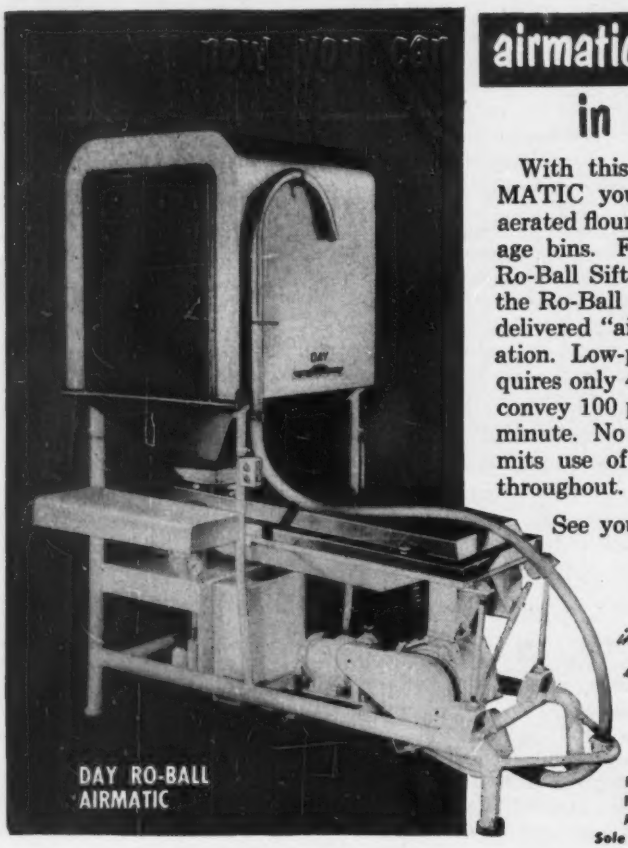
Apparatus for Feeding Parallel Horizontal Cylinders Comprising Hopper Above Spaced Vertical Walls, Reciprocable Pusher Slats, Delivery Control—*D. G. Ashcroft, Saltcoats, Scotland, to Imperial Chemical Ind., Ltd., England. No. 2,682,983. July 6, 1954.*

Cream Separator With Bowl, Sealing Shell, Discharge Opening, Rotatable Screw—*H. A. Heckendorf, Chicago to International Harvester Co. No. 2,682,992. July 6, 1954.*

Pallet Supporter and Spacer Comprising Slotted Intersecting Panels, Means for Engaging Pallet—*J. P. Hammerslag, Jr., San Francisco, Calif. No. 2,683,010. July 6, 1954.*

Fish Dressing Machine With Tool-Actuating Device, Feeler Means for Positioning Cam Member According to Fish Dimension —*R. Baader, Lubeck, Germany No. 2,683,893. July 20, 1954.*

Grain Drier Comprising Tubular Air Heater Inserted in Bin Inlet, Means for Introducing Compressed Air—*H. A. Pixler, Whiting, Iowa. No. 2,683,940. July 20, 1954.*



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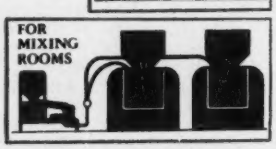

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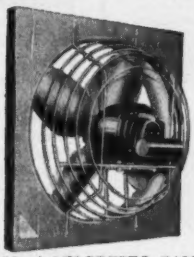
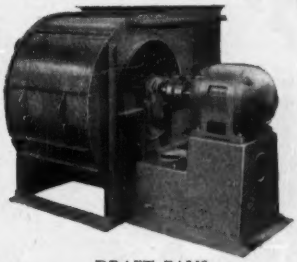
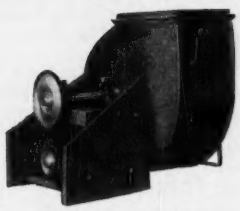


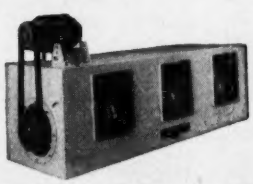
New! NV-BREEZO FANS
Their specially-shaped four-blade wheel gives high efficiency even against system pressures of ¼" and ½". 8" to 24" sizes.
BULLETIN 3865



DRAFT FANS
"Buffalo" mechanical Draft Fans are helping turn out low-cost steam in plants and major utility stations everywhere.
BULLETIN 3750



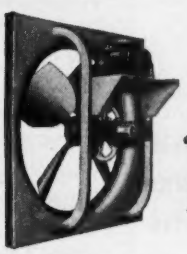
BELTED VENT SETS
Non-overloading ventilating fans for duct or free air delivery. Extra quiet.
BULLETIN 3720



SHORTBOY VENTILATING SETS
Quiet, efficient, vibration-free fans. Wheels mounted on hollow shaft.
BULLETIN 3701

"Buffalo"

*The "Q" Factor — *The built-in Quality which provides trouble-free satisfaction and long life.*



New! BELT-AIR FANS
Quiet, sturdy fans to move a lot of air at negligible cost. Heavy-gauge die-stamped blades and panel.
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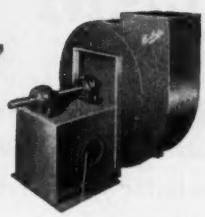

INDUSTRIAL EXHAUSTERS
All-welded for strength and high efficiency. With air or material wheels.
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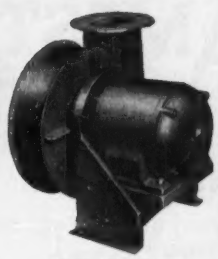

"CB" PRESSURE BLOWERS
Up to 2¼ psi, single stage with these husky, space-saving units!
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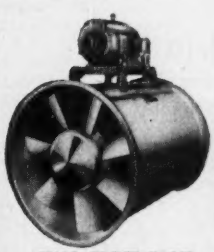
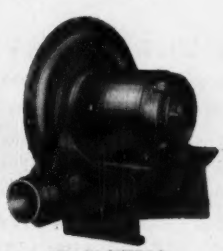


AXIAL FLOW FANS
Compact, light, highly efficient ventilating fans for light duty.
BULLETIN 3533



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For low to medium pressures and volumes in draft, cleaning, line boosting.
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Viscosity Measuring Device Having Liquid Container, Drag Member, Recording Unit—*A. R. Boyle, M. C. P. Hewitt, and J. More, to Dobbie McInnes Ltd., Glasgow, Scotland. No. 2,683,984. July 20, 1954.*

Electric Gas Flowmeter Comprising Liquid Chamber, Bubble Forming Cell, Gas Inlet Measuring Means—*W. W. Bartlett, Newport, and P. Smoot, Portsmouth, R.I., to USA. No. 2,683,986. July 20, 1954.*

Selector Mechanism to Automatically Control Path of Load-Carrying Trolleys With Track System, Switches, Lift, Drop Sections—*D. M. King, Hitchin, England. No. 2,684,039. July 20, 1954.*

Vacuum Breaking Apparatus Comprising Hollow Casing, Automatic Valves, Ducts—*E. Stossel, San Francisco. No. 2,684,075. July 20, 1954.*

Can Unscrambler Comprising Two Conveyors Operating at Different Speeds, Bridged by Inclined Scuff Plate, Guides for Turning Cans Lengthwise—*K. Holstebro, Gildersleeve, Conn., to Emhart Mfg. Co. No. 2,684,147. July 20, 1954.*

Multiple Tank Assembly for Open Fermenters With Plurality of Hollow Reinforcing Ribs—*E. Schmitz to A. O. Smith Corp., Milwaukee, Wis. No. 2,684,174. July 20, 1954.*

Baking Pan With Heat-Treated Coating of Alkyd Resin Containing 5-15% Stearine Pitch by Weight, Superposed With Organopolysiloxane Resinous Coating in Infusible, Insoluble State—*D. W. Kennedy, Troy, N. Y. to General Electric Co. No. 2,684,177. July 20, 1954.*

Cereal Grinding, Decorticating Machine Comprising Fixed Frame, Rotating Shafts in Parallel Vertical Cheeks, Abrasive Bands, Feed, Discharge Devices—*E. H. J. Grimard, Liege, Belgium. No. 2,684,205. July 20, 1954.*

Shrimp Deveining Apparatus Having Frame, Feed Trough, Holding, Cutting Means—*J. M. Jones and P. C. Ashley to B. H. Jones, Edenton, N.C. No. 2,684,500. July 27, 1954.*

Shell Fish Drag With Frame, Entrance Channel, Braced Bail, Rearwardly Extending Net, Suction Plate to Agitate Sea Bottom —*A. Olden, New Bedford, Mass. No. 2,684,549. July 27, 1954.*

Temperature-Humidity Indicator Having Meter, Humidity-Sensing Element, Means for Periodically Reversing Element Connections—*R. E. Hadady to American Instrument Co., Silver Spring, Md. No. 2,684,592. July 27, 1954.*

Carton Blank Setting-Up Mechanism Comprising Die Cavity, Reciprocating Plunger, Blank Supporting Element, Longitudinal, Lateral Registering Means—*R. J. Hickin to Ohio Boxboard Co., Rittman, Ohio. No. 2,684,616. July 27, 1954.*

Lobster Broiler With Adjacent Semi-Cylindrical Members, Medially Positioned Rib, Flat Plate for Keeping Lobster Portions Horizontal During Broiling—*W. Trunk, Sioux Falls, S.D. No. 2,684,625. July 27, 1954.*

Can End Embossing Machine Having Cooperating Marking Heads Mounted on Shafts Between Housed Bearings, Actuating Means —*F. W. Duhan, Philadelphia, Pa., to Crown Cork & Seal Co., Baltimore, Md. No. 2,684,627. July 27, 1954.*

Potato Peeler Comprising Receiving Container, Abrasive Disk With Curved Vanes, Top Opening on Disk for Expelling Peel—*W. C. Hagen, East Orange, N.J. No. 2,684,701. July 27, 1954.*

Conveyor Lubricating Apparatus Having Rotatable Head, Plurality of Radial Nozzles Engaging Fittings on Conveyor—*G. A. Freiman, Berkley, Mich. No. 2,684,733. July 27, 1954.*

Egg Handling Conveyor With Plurality of Laterally, Longitudinally Aligned Spherical Members, Alternately Long, Short Vertical Fixed Rods for Straightening Eggs —*R. C. Sneed, Piedmont, Calif., to Safeway Stores, Oakland, Calif. No. 2,684,748. July 27, 1954.*

Flexible Conveyor for Corn-Cutting Machine With Movable Pins in Longitudinal Edges Deforming Flight in V Shape—*H. P. Schultz to Schultz Sweetman Inc., Two Rivers, Wis. No. 2,684,752. July 27, 1954.*

Lifting Truck Fork Comprising Frame, Four Horizontal, Parallel Spaced Arms, Interengaging Screw, Nut Elements, Means for Rotating Screw Elements at Same Speed—*V. H. Cartwright, Peoria, Ill. No. 2,684,772. July 27, 1954.*

Lift Truck Having Support Pivotally Mounted on Frame, Slidable Carriage, Lifting Element Adapted to Engage Article—*G. H. Boyles, Erie, Pa., to General Electric Co., N.Y. No. 2,684,773. July 27, 1954.*

Container Closure Comprising Metallic Shell, Resilient Molded Vinyl Resin Sealing Liner—*E. O. Aichels, Hillside, N. J. No. 2,684,774. July 27, 1954.*

Flow Meter With Remote Register Comprising Open-Top Housing, Rotating Shaft, Flexible Coupling—*W. C. Bryant, Kansas City, Kan. No. 2,684,810. July 27, 1954.*

Portable Milk Cooler With Annular, Helical Passage Between Upstanding Coaxial Drums, Tubular Coolant Member—*M. M. Karr, Oneida, Wis. No. 2,685,132. Aug. 3, 1954.*

Fruit Picking Device Comprising Open Ended Casing, Pivoted En-

gaging Plate, Solenoid-Controlled Teeth to Sever Stems—*J. E. Taylor, De Land, Fla. to L. A. Peek, W. Palm Beach, Fla. No. 2,685,163. Aug. 3, 1954.*

Hydrometer Having Transparent Barrel, Attached Base With Liquid Passage, Collapsible Bulb, Float With Indicia on Stem—*R. B. Edelmann to E. Edelmann & Co., Chicago. No. 2,685,196. Aug. 3.*

Deep Fat Cooking Apparatus With High, Low Heat Transfer Sections Comprising Fluid Container, Communicating Trough Inserts—*W. L. Badger, Ann Arbor, Mich. to Wise Potatoe Chip Co., Berwick, Pa. No. 2,685,249. Aug. 3, 1954.*

Fruit Pitting Machine Components Comprising Seed Centering, Orienting, Gripping Means—*W. D. Peel, Oakland, Calif. No. 2,685,313. Aug. 3, 1954.*

Bottle Washer Loading Device With Main and Feed Conveyors, Plurality of Divider Plates, Bottle Engaging, Transfer Means—*J. P. Heil and J. B. McCabe, Milwaukee, and A. F. Meyer, Pewaukee, Wis. to Cherry-Burrell Corp., Chicago. No. 2,685,358. Aug. 3, 1954.*

Fish Cleaning Machine Comprising Frame, Endless Chain, Holding, Securing Arms, Spring Tension Members—*N. Kaplan, Atlanta, Ga. No. 2,685,360. Aug. 3, 1954.*

Boneless Ham Pressure-Packer With Supporting Frame, Movable Jaws, Casing, Closure Means—*I. Rabinowitz to Irving Machinery Co., Philadelphia, Pa. No. 2,685,394. Aug. 3, 1954.*

Filling Nozzle Having Downspout, Valve Assemby, Liquid and Air Passages—*C. L. Day and L. F. Pahl to Crown Cork & Seal Co., Baltimore, Md. No. 2,685,396. Aug. 3, 1954.*

Shrimp Cleaning and Deveining Machine. Comprising Support Structure, Movable Rack, Devices for Removing Legs, Shell, Vein—*P. A. Streich, Philadelphia, Pa., E. P. Tait, Atlanta and V. R. Clark, Decatur, Ga. to Tait-Clark-Streich Machinery Corp., Decatur, Ga. No. 2,685,705. Aug. 10, 1954.*

Poultry Shackle Comprising Pair of Triangular Frames, Pin-Connected Bases With Outwardly-Arched Ends, Locking Member Slidable on Vertical Rods—*R. S. Zebarth, Hickman Mills, to Gordon W. Johnson Co., Kansas City, Mo. No. 2,685,706. Aug. 10, 1954.*

Freeze Drier Comprising Jacketed Container, Fluid Inlet, Outlet, Vibratory Screen, Centrifuge, Product Recovery Means—*N. H. Benscheidt and J. R. Pattinson, Hutchinson, Kan. to Commonwealth Engineering Co., Dayton, Ohio. No. 2,685,783. Aug. 10, 1954.*

Liquid Level Tank Gage With Magnetic Indicating Device—*A. J. Morschel, Yonkers, N. Y. to Liquidivision Gauge & Control Corp., N.Y. No. 2,685,797. Aug. 10, 1954.*

Pipet for Microanalysis With Constricting Element Attached to Inner Wall—*S. Natelson, Rockford, Ill. to Kopp Schientific, Inc., New York City. No. 2,685,800. Aug. 10, 1954.*

Vibrating Hopper With Hinged Plate Actuated by Horizontal, Reciprocating Rod—*J. H. Hampton, Oaklyn, N. J. to Beaumont Birch Co., Philadelphia, Pa. No. 2,685,986. Aug. 10, 1954.*

Apparatus for Pneumatically Conveying Finely Comminuted Material Comprising Inverted Conical Container, Top Feed Inlet, Bottom Discharge, Compressed Air Manifold—*J. H. Hampton, Oaklyn, N. J. and T. E. Pynor, Port Kennedy, Pa. to Beaumont Birch Co., Philadelhpia, Pa. No. 2,686,083. Aug. 10, 1954.*

Portable Pneumatic Conveyor Having Frame, Hopper, Blowers, Inlet, Discharge Conduits—*C. A. Baldwin, Streator, Ill. No. 2,686,084. Aug. 10, 1954.*

Fruit Sizer Comprising Frame, Pivotally Connected Diverging Cross Beams, Rotatable Transverse Shaft—*C. Harden, Pasadena to Brown Citrus Machinery Corp., Whittier, Calif. No. 2,686,591. Aug. 17, 1954.*

Pallet Gate Assembly Comprising Base, End Gates Interlockingly Engaged Between Transverse Cleats, Bottom Cross Bars Braced by Top Spacer Bar, Flexible Cable—*M. H. McMillan, Vallejo, Calif. No. 2,686,646. Aug. 17, 1954.*

Pump for Kneading, Conveying Plastic Materials Comprising Inter-Engaging, Oppositely Rotating Worms With Screw Surfaces—*F. Kleinlein, Furth (Bay) and M. Bernhardt, to Maschinenfabrik Paul Leistritz, Nurnberg, Bavaria, Germany. No. 2,686,336. Aug. 17, 1954.*

Potato Chip Piercing Machine With Frame, Conveyor Belt, Plurality of Rotatably Mounted Teeth, Combing Members to Guide Overlapping Chips to Engaging Area—*B. Stahmer, Omaha, Neb. No. 2,686,540. Aug. 17, 1954.*

Citrus Juice Extractor Having Vertical Knife Blade, Curved Divider Plate, Synchronous Selector, Retarder Members—*C. Harden, Pasadena to Brown Citrus Machinery Corp., Whittier, Calif. No. 2,686,541. Aug. 17, 1954.*

PACKAGING

Waxing Closed-Bottom Cartons by Moving Through Molten Wax Bath, Draining, Smoothing, Cooling—*J. A. Zinn, Jr., Chicago. No. 2,684,308. July 20, 1954.*

Articles Transferred From Upper Endless Belt, Deposited in Cases on Lower Conveyor—*J. H. Holstein, Fresno, Calif. No. 2,684,799. July 27, 1954.*

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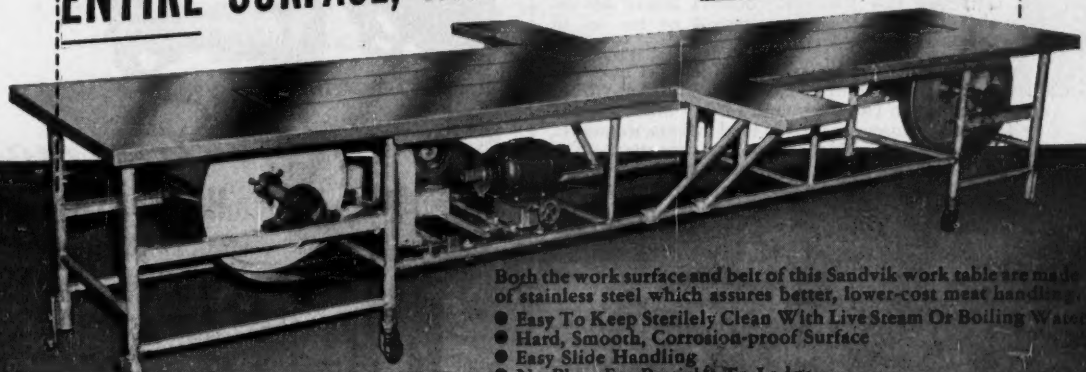

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- Easy Slide Handling
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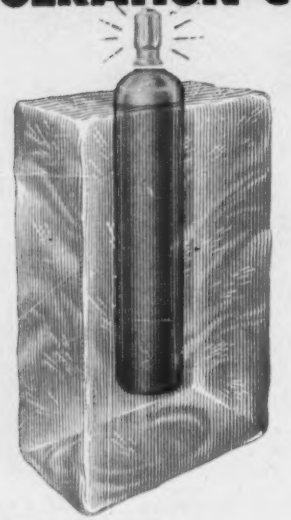

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Label Adhesive Applicator Comprising Rotating Vertical Cylinder, Spiral Peripheral Grooves to Transfer Adhesive to Roller—*N. A. Zander, Stow, Mass. No. 2,686,607. Aug. 17, 1954.*

Bottle-Packing Machine Comprising Chutes Formed by Plurality of Spaced Parallel Rails, Vertically Moving Cross Bars, Feed, Transfer Means—*L. Wimmer and E. Ardell, Middltown, Conn. to Emhart Mfg. Co. No. 2,686,623. Aug. 17, 1954.*

Egg Shipping Case Comprising Outer Bottomless Shell, Liner With Series of Panels Foldably Connected—*R. Guyer to Waldorf Paper Products Co., St. Paul, Minn. No. 2,686,628. Aug. 17, 1954.*

Composite Heat-Sealable Wrapper Comprising Polythene Film Anchored to Regenerated Cellulose Sheet With Melamine-Formaldehyde Resin—*R. T. K. Cornwell, Rosemont, Pa. to American Viscose Corp., Wilmington, Del. No. 2,686,744. Aug. 17, 1954.*

Container-Band Severing Tool With Flat Upper, Lower Surfaces, Cutting Head, Shank Section—*L. M. Furey, Warwick, Va. to USA. No. 2,686,969. Aug. 24, 1954.*

Carton Sealing Apparatus With Means for Positioning Bottom Flaps, Applying Adhesive, Compressing—*K. A. Strzala, San Pablo, Calif. to Owens-Illinois Glass Co. No. 2,687,068. Aug. 24, 1954.*

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

Fruit Package Comprising Integral Molded Pulp Sheet With Concave Tray-Like Sections—*W. H. Randall, Waterville, Me. to Canal National Bank of Portland, and P. Thompson, No. 2,687,246. Aug. 24, 1954.*

Powder Weighing and Filling Machine Comprising Two Hoppers, Scale, Inlet, Outlet Valves—*C. F. Carter, Danville, Ill. No. 2,687,271. Aug. 24, 1954.*

Labeling Machine With Article Runway, Endless Belt, Label Applicator, Timed Actuating Means—*G. Hill, Bettendorf and F. L. Bennett, Le Claire, Iowa to Bettendorf Bakery Equipment Co., Bettendorf, Iowa. No. 2,687,819. Aug. 31, 1954.*

Labeling Device Having Multi-Sided Pick-Up, Delivery Members, Gum Applicator, Transfer Pusher, Actuating Means—*D. H. Fairest to Morgan Fairest, Ltd., Sheffield, England. No. 2,687,821. Aug. 31.*

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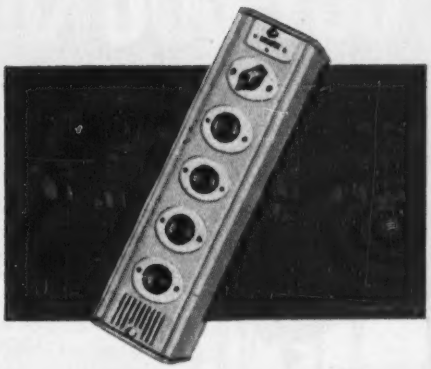

With a Century Performance Rated Selective Speed Drive, you can often integrate speed changes to cycle automatically as the process requirements dictate.

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- Make the speed change automatically sensitive to changing diameter of a feed roll.
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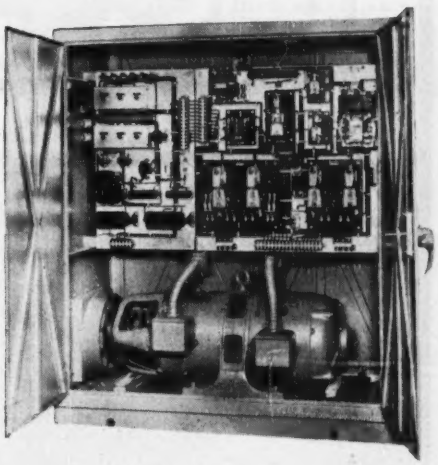
- You can use many different kinds of control devices in the control circuit to change speeds ... to jog ... to apply dynamic braking, etc.



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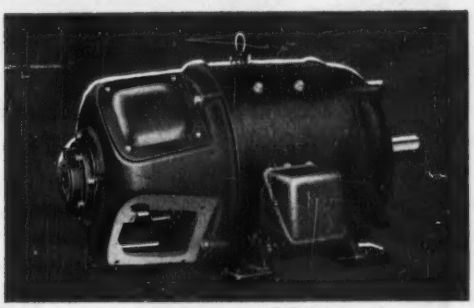

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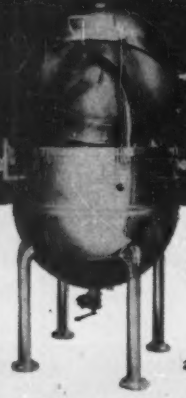
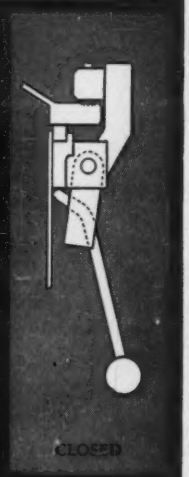
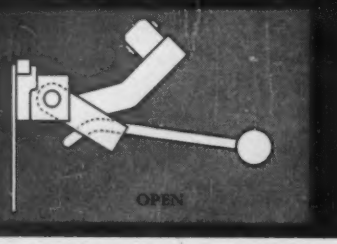


Faster, one-motion FLIP-LATCHES on Hamilton Vacuum Kettles and Pressure Cookers cut costly load-discharge time in half. It's easy and fast to open and close the covers on Hamilton Kettles with Flip-Latches as compared to kettle cover fastenings employing wing nuts, lever-battens or nuts requiring wrenches.

For Vacuum or Pressure—the Hamilton "FLIP-LATCH" will insure a perfect seal. Should the gasket compress, just turn the stainless steel adjusting screw and secure with locking screw to the proper tension. Easy? Yes! And requires only a few minutes time. All steel construction except adjusting screw.





With Hamilton FLIP-LATCHES cutting your load-discharge time in half, figure your savings . . . either in terms of production time . . . cost per batch . . . man-hours . . . or net profit. No matter how you figure it the FLIP-LATCH feature will save you plenty.

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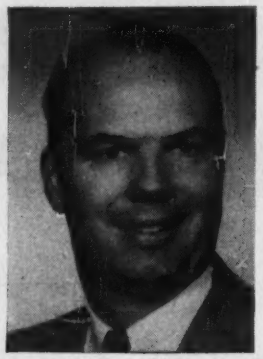
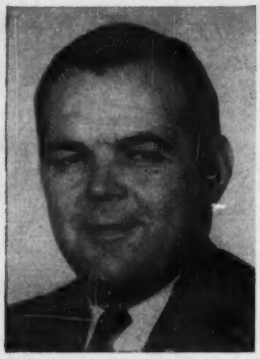
Men & Companies





George Andrews (right) and Urban Ebel have formed the Anbel Food Specialties Co. with services devoted exclusively to automation. They are also new representatives on the East Coast for Chicago Stainless Equipment Corp.

Industry

Albers Super Market Co. at Columbus, Ohio, has begun construction of a $2,000,000 warehouse for produce, meats, and dairy products.

Allensville Grain Co., Allensville, Ky., has been incorporated for $100,000 to operate a general grain and milling company.

Borden's has acquired Sani-Seal Dairies, Inc., with plants in three Michigan cities.

British-Columbia Packers, Ltd., has taken over Freeman Certi-Fresh Foods, of Los Angeles.

California Avocado Growers Association, Los Angeles, will build a 15,000 sq. ft. packing plant in Ventura County, Calif.

California Wine Association and **Wine Growers Guild,** representing about 1,200 growers, have merged.

Coastal Poultry Products, Inc., Jacksonville, N. C., has obtained a charter of incorporation with authorized capitalization of $100,000.

College Inn Food Products Corp. announced it has purchased "Frost-It", ready-to-spread cake frosting.

Continental Baking Co. has purchased Royal Baking Co.

Consolidated Foods Corp., Chicago, has announced purchase of Gibbs & Co., Inc., Baltimore food producer.

Dairy Queen Mix, Atlanta, held formal opening ceremonies for its new $355,000 plant in Atlanta.

Dr. Phillips Co. has announced sale of its citrus grove holdings to Granada Groves Corp. which in turn simultaneously announced their lease to Minute Maid Corp.

Fair Bluff Milling Co., Inc., has been capitalized in Fair Bluff, North Carolina for $100,000.

Foremost Dairies, Inc., has approved plans for the acquisition of control of American Dairies, Inc.

General Foods has completed negotiations for acquiring 55 acres in Tarrytown, N. Y., for the construction of an enlarged food research center.

J. E. Sellers has been appointed to the executive staff of White-Stokes Co., Chicago candy manufacturers, as technical advisor, bringing to his new position over 35 years experience in the candy industry.

William M. Martin, who has been director of research for Rheem Mfg. Co., will join the G. F. Heublein Co. on January 1st as vice-president of firm's subsidiary, Andersen's Foods, Inc. of Santa Barbara. There he will be user of the aseptic canning process which he invented.

General Mills, Inc., has announced completion of a single-story warehouse facility at its Buffalo, N. Y., plant.

Goebel Brewing Co., Detroit, signed a license agreement with Arthur Guinness Son & Co., Ltd., of Dublin and London to produce Guinness ale, lager and beer.

Home Style Cookie Co. has been incorporated with authorized capital stock of $100,000 to deal in bakery products in Charlotte, N. C.

Leslie Salt Co. plans to have its $500,000 salt processing and packaging plant at La Habra, Calif., in production by next October.

Ogilvie Flour Mills Co., Ltd. has made an offer to acquire a majority of the common stock of Lake of the Woods Milling Co., according to directors of the latter company.

Ralston-Purina Co. has opened its $1.5 million mill at Gainesville, Ga.

Realemon-Puritan Co., Chicago, announced purchase of the entire olive and maraschino cherry business of Griggs-Cooper Co., St. Paul.

San Luis Valley Starch Co. has begun production of commercial starch from potatoes at its Monte Vista, Colo., plant.

Seafood Processors, Inc., Jackson, Mich., has been formed to produce and market custom breading and batter mixes under the Glo-fry brand name.

Southern California Poultry Co. completed the doubling of its Los Angeles poultry processing plant at a cost of $300,000.

Stokely-Van Camp, Inc. has begun production in its new San Jose, Calif. frozen foods plant.

Swift & Co. began operation in its meat packing plant at Jackson, Miss., with rated capacity of 1,000 cattle and 1,200 calves per week.

Glidden Co. announced it will begin immediate construction of 6.5 million bu. terminal grain elevator in Chicago to cost more than $5 million.

Personnel

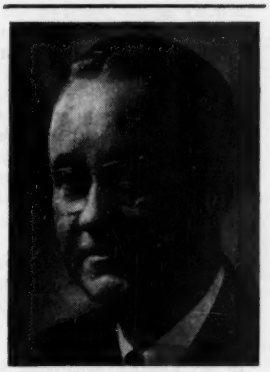
Marcel Beland was named general manager of Eastern Canada Flour Mills Ltd., Montreal.

Charles E. Brecht has been made chief of the field section of Kuner-Empson Co., Brighton, Colo., in charge of all crop growing operations.

James L. Carson, chairman of the Bank of Toronto, was elected a director of Walter M. Lowney Co., Ltd., Montreal confectionery makers.

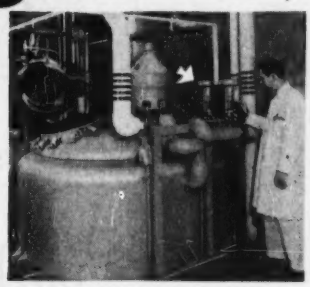
Fern W. Gleiser, professor of institution economics and management, School of Business, Univ. of Chicago, is new president of American Dietetic Assn.

Kenneth C. Holland, president of Carpenter Paper Co., was



George H. Coppers, president of National Biscuit Co. since 1945, has been elected a member of the board of directors of Stevens Institute of Technology. (Fabian Bachrach photo.)

More and more Prominent Users of POWERS FLOWRITE Diaphragm Control Valves



New ARMOUR PHARMACEUTICAL CENTER is using Powers Characterized V-Port Valves for accurate control of steam, water, vacuum and propylene glycol for various processes. Powers FLOWRITE premium quality valves are reasonably priced. Their points of superiority are described in Bulletin 344-V. Write for a copy.

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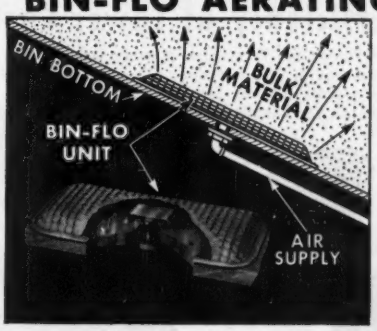

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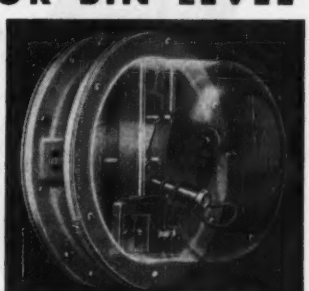
For All Bulk Materials

signals change in level; automatically starts and stops filling and emptying equipment.



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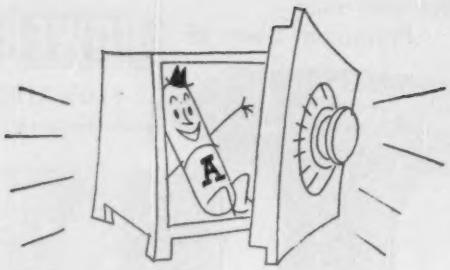

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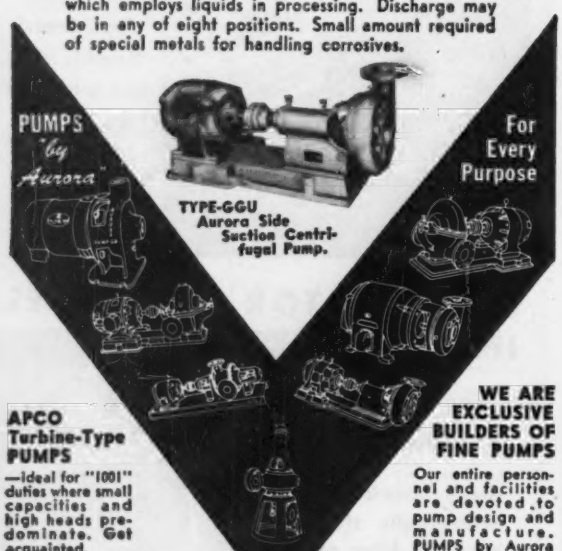
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Alfred J. Fava, executive secretary of Operating Committee, Bakery Div. of American Machine and Foundry Co., was elected president of the National Assn. of Food Equipment Manufacturers for the third successive year.

elected a director of Omar, Inc.

Rear Admiral Paul L. Joachim, USN (Ret.), has been appointed executive vice-president of Chicago Frozen Donut Co.

Austin S. Igleheart has resigned as chairman of General Foods Corp. but will continue as a director and member of the executive committee.

R. E. Osborne, vice-president and general manager succeeds T. R. Knudsen as president of Knudsen Creamery Co., Los Angeles.

Donald P. Loker, vice-president of Star-Kist Foods, Inc., has been elected president of California Fish Canners Association.

Monroe J. Lorimer is a new member of the board of Corn Products Sales Co., maker of syrup, sugar and other corn derivatives.

Howard A. Prentice, vice-president of Corn Industries Research Foundation, Inc., was named president of American Trade Assn. Executives at their 1954 annual meeting.

Dan Ridenour is new head of the Product Development and Application Div. of Wm. J. Stange Co.

H. E. Sandoz, controller for PictSweet Foods, Inc., has been named vice-president of the company.

G. Cullen Thomas, vice-president of General Mills, Inc., has been elected chairman of the board of Cereal Institute, Inc., Chicago.

Henry Weigl has been voted vice-president of Standard Brands, Inc.

Associated Industries

American Can Co.'s general manager of the engineering department, A. O. Degling, has been promoted to vice-president in charge of purchasing and traffic.

American Management Association has appointed John A. Warren as technical advisor to the Packaging Division.

Dewey & Almy Chemical Co.'s stockholders voted to approve an agreement of merger of the company into W. R. Grace & Co.

General Electric Co. has announced the creation of a new Communication Equipment Center in Redwood City, Calif.

Hoerner Boxes, Inc., has announced plans for construction of a modern corrugated box plant in Minneapolis, to be started immediately.

Minneapolis-Honeywell Regulator Co. has acquired Doelcam Corp., Boston firm making precision instruments and control equipment.

Morse Chain Co., Borg-Warner Corp. subsidiary, has named Louis P. Smith vice-president of manufacturing operations for the entire company.

Packaging Assn. of Canada's new president is Lyle D. Richardson.

Wyandotte Chemicals Corp.'s new plant for its J. B. Ford Division is now in production in Los Nietos, Calif.

Deaths

Jesse S. Ferris, 84, president of Uebler Milking Machine Mfg. Co., Vernon, N. Y.—Nov. 8.

Charles Godchaux, 85, chairman emeritus of Godchaux Sugars, Inc., New Orleans.—Oct. 23.

Walter B. Huff, 61, manager of Newport (Ark.) Rice Mill. —Oct. 25.

William T. Nardin, 80, chairman of the board of Pet Milk Co.—Oct. 25.

Just Off the Press

NEW CATALOGS AND BULLETINS: SEND FOR YOUR COPIES BY ENCIRCLING NUMBERS ON READER SERVICE CARD

PLANT ENGINEERING

Screw Holders

Information on magnetic screw holding accessories for power screw drivers and nut setters, with selection tables. 24 p. manual.—*Magna Driver Corp., 779 Washington St., Buffalo 3, N. Y. (215A).*

Safety Valves

Description of safety valves for use with various refrigerants, with capacity and selection tables. Bulletin 194-A. 4-p.—*Frick Co., Waynesboro, Pa. (215B).*

Refrigerant Coils

Fourteen-gauge steel fins for cooling coils with bond strong enough to support fins measuring 7 in. sq., with photos and engineering diagrams. 4 p. brochure.—*Frick Co., Waynesboro, Pa. (215C).*

Regulating Valves

Description and illustration of types of automatic regulating valves and controls. Bulletin 2. 4 p.—*Atlas Valve Co., 280 South St., Newark 5, N. J. (215D).*

Steel Pipe

Information on problems involving stainless piping, including dimension tables and condensed technical data on mechanical and physical properties. Bulletin TB-356. 6 p.—*Babcock & Wilcox Co., Beaver Falls, Pa. (215E).*

Suspension Idler

Operating features of flexible, 2-bearing suspension idler for above or below ground belt conveyors. Bulletin LD-103. 4 p.—*Joy Mfg. Co., Oliver Bldg., Pittsburgh 22. (215F).*

Submersible Pump

Details on pump designed for deep wells to 280 ft. and for providing capacities up to 940 gal. per hr. from shallower setting. Bulletin B-2455. 4 p.—*Peerless Pump Div., Food Machinery & Chemical Corp., 301 West Ave. 26, Los Angeles 31. (215G).*

Equipment Catalog

Comprehensive listing of miscellaneous equipment, including chains and sprockets, gear drives, transmission products, conveyor components, and engineered products such as vibrating screens, car icing equipment, power scoops and car spotters, with capacity charts, dimension tables, flexible cover and thumb index, and illustrations. Catalog 950. 340 p.—*Link-Belt Co., 307 N. Michigan Ave., Chicago 1. (215H).*

Standby Electric Units

Description of ac electric power plant for protection against power failure. Bulletin 29a. 4 p.—*D. W. Onan & Sons Inc., 8230 University Ave., S. E., Minneapolis 14. (215I).*

Exhauster Units

Detailed information and performance tables on exhausters with special design for eliminating air turbulance to provide quiet performance. Bulletin GPE-103.—*Chicago Blower Corp., 9867 Pacific Ave., Franklin Park, Ill. (215J).*

Storage Heaters

Capacities and weights, dimensions, conversion tables, fixture capacities, material thicknesses, heating elements, and construction details of various hot water storage heaters. Catalog 18. 48 p.—*Patterson-Kelley Co., Inc., East Stroudsberg, Pa. (215K).*

Insulating Fill

How to install expanded vermiculite insulation for wall or floor surfaces. Form AD-2. 14 p.—*Zonolite Co., 135 S. La Salle St., Chicago 3. (215L).*

Combustion Valves

Description and photos of valves for combustion control. Bulletin M.—*Eclipse Fuel Engineering Co., Rockford, Ill. (215M).*

Supporting Cable

Description of line of cable troughs to hold utility cable installations. Bulletin 754-A. 8 p.—*P-W Industries, Inc., 4500 E. Melrose St., Philadelphia 24. (215N).*

Steam Traps

Information on steam traps said to heat steam units 8 times faster than other units. Bulletin 1153. 4 p.—*V. D. Anderson Co., 1935 W. 96th St., Cleveland 2. (215O).*

Tube Fittings

Technical data on line of stainless steel flared tube fittings. Catalog.—*Special Screw Products Co., 5445 Dunham Rd., Bedford, Ohio. (215P).*

Air Traps

Information on methods of selecting and installing air traps for automatic drainage of water from compressed air systems, with detail drawings and list prices. Bulletin 2022. 4 p.—*Armstrong Machine Works, Three Rivers, Mich. (215Q).*

Automatic Regulators

Description and photos of eleven automatic regulating devices, including high and low pressure reducing valves, relief and lever operated control valves, pump governors, etc. 4 p. bulletin.—*Atlas Valve Co., 280-284 South St., Newark 5, N. J. (215R).*

Tubular Pumps

Description of improved cradle mounted tubular pumps for higher pressures and added resistance to abrasion. Form 3395. 4 p.—*Robbins & Myers, Inc., Springfield, Ohio. (215S).*

Progressing-Cavity Pumps

Details of construction and operation of positive displacement pumps said to pump almost anything that will flow through pipe. Bulletin 30-C. 8 p.—*Robbins & Myers, Inc., Springfield, Ohio. (215T).*

Aluminum Pipe Covering

Features of permanent corrosion-proof pipe covering for insulated lines.—*Walex Metal Products Co., 1212 W. 14th St., Houston 8, Tex. (215U).*

Hose Varieties

Characteristics and uses of miscellaneous types of hose, with application photos and dimension tables. Catalog M-0840-1. 12 p.—*U. S. Rubber Co., 1230 Ave. of Americas, New York City. (215V).*

Industrial Relays

Detailed description of line of plug-mounted industrial relays. Leaflets 1800, 1801, 1802, 1803, 1804.—*Automatic Electric Sales Corp., 1033 W. Van Buren St., Chicago 7. (215W).*

Self-Locking Nuts

Information on all-metal locknuts and how they work. Bulletin 866-1. 4 p. Also leaflet (Form 2018) on aluminum nuts.—*Standard Pressed Steel Co., Jenkintown, Pa. (215X).*

Sanitary Pumps

Features of line of stainless steel sanitary centrifugal pumps, said to be capable of handling almost any free flowing liquid food product, with photos, dimension tables and selection charts. Form 2200. 8 p.—*Creamery Package Mfg. Co., 1243 W. Washington Blvd., Chicago 7. (215Y).*

Meat Processing Equipment

Information on, specifications, prices and more than 500 illustrations of equipment and supplies used in slaughtering meat processing. Catalog 79. 80 p.—*Koch Supplies, Dept. 22, 2520 Holmes St., Kansas City 8, Mo. (215Z).*

Diffusion Pumps

Characteristics of line of diffusion pumps, with operating charts and photos. Catalog.—*Naresco Equipment Corp., 160 Charlemont St., Newton Highlands 61, Mass. (215AA).*

Vertical Pumps

Description and illustrations of two types of vertical, encased, close-coupled pumps. Bulletin B-1700. 10 p.—*Peerless Pump Div., 301 West Ave. 26, Los Angeles 31. (215AB).*

Air Conditioning Equipment

How to heat or cool or change humidity of air by means of recently developed "changers." Bulletin DS-303.—*Trane Co., La Crosse, Wis. (215AC).*

Gear Drives

Details on operation of worm gear drives and speed reducers. 8 p. brochure.—*Cleveland Worm & Gear Co., 3249-59 E. 80th St., Cleveland 4. (215AD).*

Tube Furnaces

Two models and seven sizes of high-temperature electric unit-package tube furnaces. Bulletin 310. 4 p.—*Burrell Corp., 2223 Fifth Ave., Pittsburgh 19. (215AE).*

Long-Wear Gearing

Features and advantages of long-wear, heavy-duty custom-made gearing. Bulletin DRB. 8 p.—*Foote Bros. Gear & Machine Corp., 4545 S. Western Blvd., Chicago 9. (215AF).*

Chain Drives

Facts on how to install and maintain sprockets and heavy-duty chain drives. Form I-M. 6 p.—*Morse Chain Co., 7601 Central Ave., Detroit, Mich. (215AG).*

Draining Scoop

Fundamental principles of new syphon scoop for draining cylinder dryers. Bulletin 266. 4 p.—*Armstrong Machine Works, Three Rivers, Mich. (215AH).*

Electric Heater

Facts on electric heater which makes use of copper sheathed, mineral insulated, resistance cable. Bulletin 1603. 8 p.—*Nelson Electric Mfg. Co., Tulsa, Okla. (215AI).*

Diaphragm Valves

Information on diaphragm valves suitable for air and water service and other applications. Catalog.—*Grinnell Co., Inc., Providence, R. I. (215AJ).*

Centrifugal Pumps

Line of pumps with 3-bladed impeller, said to be particularly applicable in beverage, food and

dairy applications for meeting high head requirements. — *Tri-Clover Div., Ladish Co., Kenosha, Wis. (215AK).*

Shaft-Mounted Drives

Features of all-steel shaft mounted drives, with selection and dimension details. Bulletin.—*Falk Corp., Milwaukee 8. (216A).*

Rubber-Lined Pumps

Design and construction features of line of vulcanized-rubber-lined centrifugal pumps and stainless steel and cast steel centrifugal pumps. 8 p. catalog—*Industrial Filter & Pump Mfg. Co., 5900 Ogden Ave., Chicago 50. (216B).*

High Speed Compressors

Construction features of multi-cylinder compressors for high stage or booster service. Bulletin 317. 8 p.—*Vilter Mfg. Co., Milwaukee 7. (216C).*

Liquid Pumps

Details on rotary liquid pumps for liquid transfer and recirculation. Bulletin 424. 4 p.—*Vilter Mfg. Co., Milwaukee 7. (216D).*

Steam Ejectors

How steam jet ejectors can help cut cost of vacuum production. Bulletin 9013-A.—*Ingersoll-Rand, 11 Broadway, New York City 4. (216E).*

Turbine Pumps

Illustrated construction features and applications of vertical turbine pumps with capacities to over 3,500 GPM. Bulletin 4700. 24 p. —*Deming Co., 556 Broadway, Salem, Ohio. (216F).*

Electromagnets

Information on electro spout magnets to remove tramp iron in bulk materials. Bulletins 92F & 97E.—*Stearns Magnetic, Inc., 667 S. 28th St., Milwaukee 46. (216G).*

Ventilating Equipment

Information on line of fans, exhausters, pressure blowers and ventilating sets. Bulletins F-100, 3865, 3750, 3720, 3701, 3576, 3553, 3533, 3014, and 3615.—*Buffalo Forge Co., Buffalo, N. Y. (216H).*

Brake Motors

Information on line of motors with dynamic braking. Data 3810. —*Master Electric Co., Dayton 1, Ohio. (216I).*

Tubing Supports

Construction details of prefabricated steel parts in straight trough runs and fittings to give continuous and permanent support to instrument tubing. Bulletin 254. 10 p.—*Instrof Inc., 4923 Pentridge St., Philadelphia 43, Pa. (216J).*

Fat Extractors

Mechanical and operation features of unit for extraction of fats from vegetable products. Bulletin 08-40A. 8 p.—*French Oil Mill Machinery Co., Piqua, Ohio. (216X).*

Crackling Expellers

Features, photos and installation diagrams of machines for expelling cracklings. Booklet T12-50-2000. 28 p.—*V. D. Anderson Co., 1935 W. 96th St., Cleveland. (216Y).*

Line-Type Purifier

Information on units for elimination of moisture, dirt, solids, guck, and entrainment from steam, air, gases and vapor. Bulletin 700. 8 p.—*V. D. Anderson Co., 1935 W. 96th St., Cleveland 2. (216Z).*

PROCESSING

Tomato Prepackaging

Detailed information profusely illustrated, on tomato prepackaging, from harvesting to tray overwrapping. 16 p. booklet.—*R. G. White Mfg. Corp., 101-18 97th Ave., Ozone Park 16, N. Y. (216K).*

Ice-Maker

Unit for making shell-ice free of snow, scrapings, and waste materials. Bulletin 54. 4 p.—*Frick Co., Waynesboro, Pa. (216L).*

Protein Recovery

Technical information on use of Indulin, a pine wood lignin, for removal and recovery of proteins and enzymes. Bulletin 105.—*W. Virginia Pulp & Paper Co., Charleston, S. Carolina. (216M).*

Dairy Tank Manual

Information of use of dairy tanks for refrigeration, also how to jack, move, level, and sanitize tanks. 24 p. manual—*Pfaudler Co., Dept. Z-10, Rochester, N. Y. (216N).*

Spray Dryer

Description of spray dryer with horizontal air suspension, with photos and diagrams. Bulletin 3M-18L. 4 p.—*Henszey Co., Watertown, Wis. (216O).*

Flour Sifter

Details on automatic unit to feed, sift and deliver aerated flour to dough mixers or storage bins. Specification Sheet B-105-RA.—*J. H. Day Co., 1151 Harrison Ave., Cincinnati 22. (216P).*

Dairy Equipment

Description and photos of filters for large and small milk dealers, including device to keep filter desk flat and equally suspended between two plates. Leaflets 150 & 450.—*W. M. Sprinkman Corp., 4022 N. Port Washington Ave., Milwaukee 12. (216Q).*

Filter-Drier Unit

Illustrations and description of improved model combination filter and drier. 4 p. brochure.—*A-P Controls Corp., 2450 N. 32nd St., Milwaukee. (216R).*

Vaporizer Models

Vertical and horizontal vaporizers and gas and oil fired boilers. 4 p. brochure.—*Eclipse Fuel Engineering Co., Rockford, Ill. (216S).*

Condenser-Cooler

Illustrated information on unit for large liquid cooling and condensing applications. Bulletin 123. —*Niagara Blower Co., 405 Lexington Ave., New York City 17. (216T).*

Self-Cleaning Purifiers

Description and dimensional drawings on internal type purifier for delivery of clean vapor and gases. Bulletin 103. 4 p.—*V. D. Anderson Co., 1935 W. 96th St., Cleveland 2. (216U).*

Ice Machine

Features of machine for making ice flakes. Bulletin 428. 4 p.—*Vilter Mfg. Co., Milwaukee 7. (216V).*

Ice Equipment

Applications and features of various horizontal units for making ice, with photos. Bulletin 205. 8 p.—*Vilter Mfg. Co., Milwaukee 7. (216W).*

MATERIALS HANDLING

Lift Trucks

Types of fork lift trucks with attachments, also information on tractors and platform trucks. Bulletin 1654B. 4 p.—*Buda Co., Harvey, Ill. (216AA).*

Fork Truck

Features of design, construction and performance of small power fork trucks, with selection data. 28 p. bulletin. — *Market Forge Co., Everett 49, Mass. (216AB).*

Conveying Systems

Vacuum, vacuum pressure and pressure type systems for pneumatic conveying, with selection diagrams and engineering data. Bulletin 105. 10 p.—*Convair, Pittsburgh, Pa. (216AC).*

Electric Loaders

Electrically-motored units for loading or lifting, thus eliminating ramps, stairs, etc. Form I-202. 4 p.—*Globe Hoist Co., E. Mermaid Lane at Queen St., Philadelphia 18. (216AD).*

High-Lift Truck

Information on 4,000 lb. capacity, high lift platform truck with four-wheel steering. 4 p. folder. — *Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3. (216AE).*

Conveying Equipment

Comprehensive listing and illustrated descriptions of types of gravity and power conveying equipment, including wheel and roller conveyors, live rollers, and accessories. Catalog 54. 38 p.—*Metzgar Conveyor Co., Grand Rapids, Mich. (216AF).*

Truck Shovels

Specifications and operating features of mechanical and hydraulic scoop type shovels for fork lift trucks. Form 5M-CAD-554.—*Buda Co., Harvey, Ill. (216AG).*

Power-Belt Conveyors

Report of case histories of money-saving power-belt and gravity conveyor installations. Booklet. —*Oliver Corp., A. B. Farquahar Div., York, Pa. (216AH).*

Pneumatic Handling

Systems for pneumatic handling of bulk materials so as to reduce costs, with additional information on manufacturing facilities. Bulletin G-2. 16 p. — *Fuller Co., Catasauqua, Pa. (216AI).*

Conveyor Belting

Engineering and installation data on conveyor and elevator belting. Form M-0786. 36 p.—*U. S. Rubber Co., Rockefeller Center, New York City 20. (216AJ).*

Ramps & Stackers

Information on line of materials handling equipment, including ramps and pallet stackers for efficient fork lift truck operation. 6 p. brochure.—*Elizabeth Iron Works, Inc., Box 360, Elizabeth, N. J. (216AK).*

Tailor-Made Conveyors

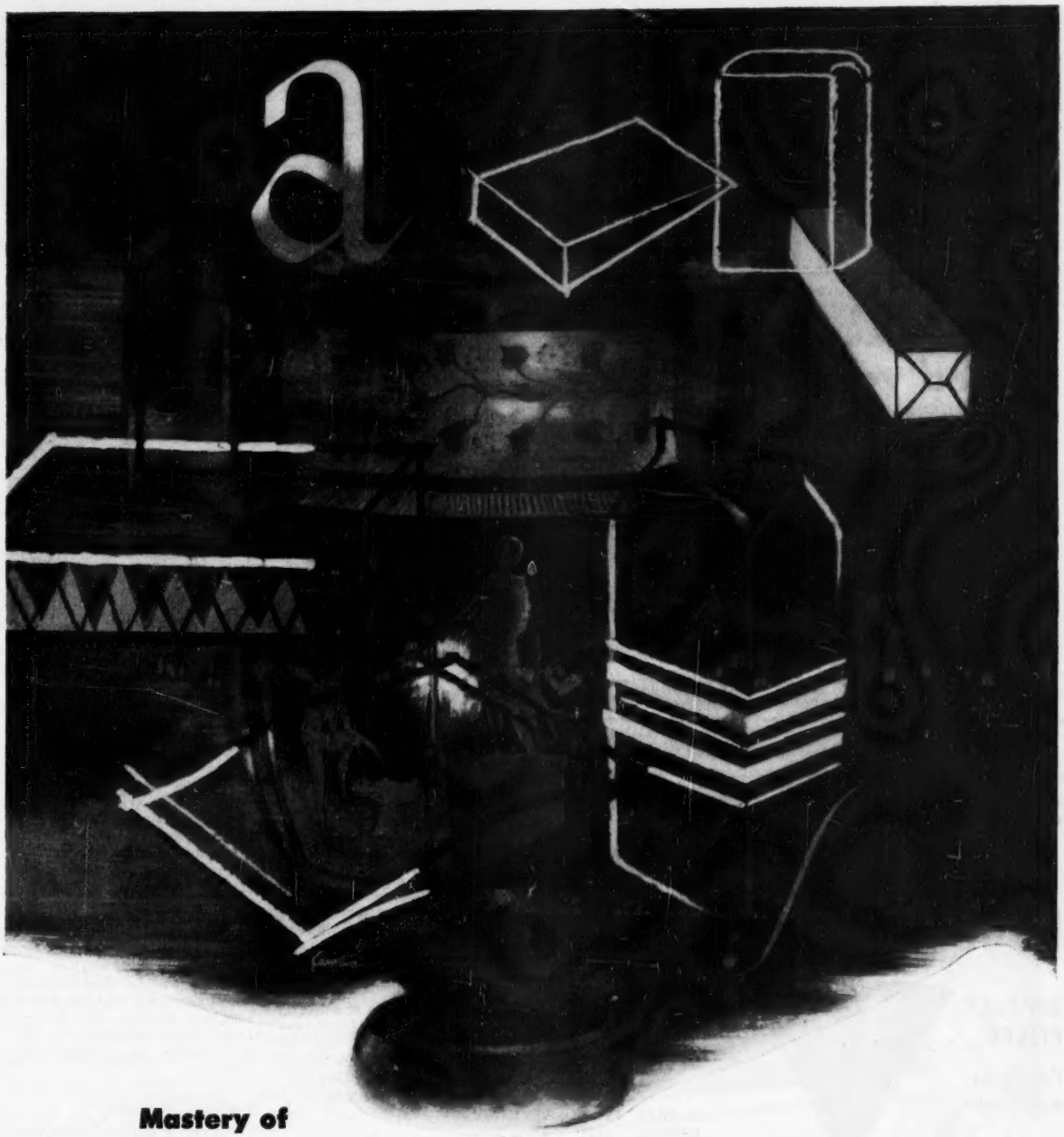
Variety of "tailor-made" conveyors and how to solve handling problems with use of combined units. 6 p. brochure.—*W. F. & John Barnes Co., 369 S. Water St., Rockford, Ill. (216AL).*

Thrower Units

Line of thrower centrifugal units designed with high-speed belts for loading or storing bulk materials. Bulletin 854. 8 p.—*Stephens-Adamson Mfg. Co., Aurora, Ill. (216AM).*

Belt Conservers

Spring type multiple-blade belt cleaner and roller type instant acting holdback to protect and conserve conveyor belts. Catalog RE-S-10M. 4 p.—*Stephens-Adamson Mfg. Co., Aurora, Ill. (216AN).*



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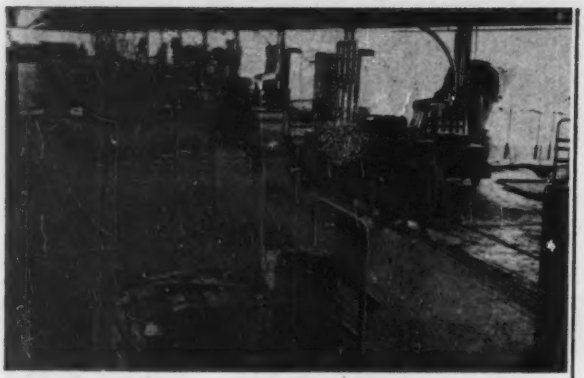

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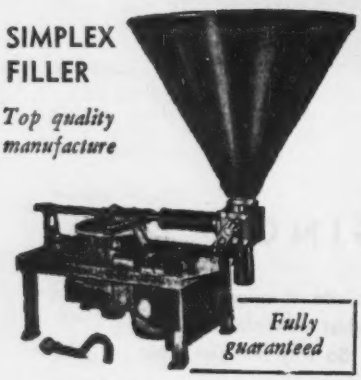

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Features of self-contained laboratory unit for control of humidity and temperature conditions. Leaflet.—*Crest Mfg. Co., 66 Potrero Ave., San Francisco. (218A).*

Diatomaceous Materials

Practical applications and operation data on diatomaceous filter aids. Bulletin 12.—*Dicalite Div., Great Lakes Carbon Corp., 612 S. Flower St., Los Angeles. (218B).*

Dairy Research

Information on laboratory services designed for dairy industry. 16 p. booklet.—*Ramsey Laboratories, Lisbon Rd. & Evins Ave., Cleveland 4. (218C).*

Miscellaneous Controls

Description of various automatic controls, including electronic liquid level, industrial timers, time switches, and magnetic switches, with photos, diagrams and capacity charts. 28 p. combined catalog.—*Lumenite Electronic Co., 407 S. Dearborn St., Chicago 5. (218D).*

Activated Carbon

Properties and uses of activated carbon in purification, air and solvent recovery, catalysis, and separation, with schematic drawings. Form 27. 4 p.—*Barnebey-Cheney Co., Adsorbite Div., Columbus 19. Ohio. (218E)*

Product Testing

Listing of specialized services in developing, improving, and evaluating products. 8 p. booklet.—*Foster D. Snell Inc., 29 W. 15th St., New York City 11. (218F).*

Gas Filter

Descriptive data, installation photos, and engineering drawings of filter for cleaning hot, wet and corrosive gases and air. Bulletin 4. 8 p.—*Mechanical Industries, Inc., 930 Grogan Bldg., Pittsburgh 22. (218G).*

Black Light

Information on characteristics, uses, and potentialities of ultra violet black light, with charts and photos of various machines. Brochure 542. 16 p.—*Burton Mfg. Co., 11201 W. Pico Blvd., Los Angeles 64. (218H).*

Screen Strainer

Concentric screen strainer for use in dairy, food products, chemical and other industries. Leaflet 553.—*W. M. Sprinkman Corp., 4022 North Port Washington Ave., Milwaukee 12. (218I).*

PACKAGING

Plastic Film Adhesives

Features and applications of adhesives for polyester film. Leaflet 130-3-54.—*Rubber & Asbestos Corp., 225 Belleville Ave., Bloomfield, N. J. (218J).*

Laminating Adhesives

Properties and uses of adhesives for film, foil, paper, fabric, and other web laminations, with application photos. Bulletin 110. 12 p.—*Rubber & Asbestos Corp., 225 Belleville Ave., Bloomfield, N. J. (218K).*

Packaging Machinery

Illustrated descriptions of various packaging machines, including packet makers, carton forming and lining machines, fillers, closing machines and agitators. Bulletin 51. 12 p.—*Delamere & Williams Co., Ltd., 18-32 Hook Ave., Toronto 9. (218L).*

Liquid Filler

Combination liquid and paste filler, closer and crimper with ejector for bottles, cans and jars. Form AC-30.—*Arthur Colton Co., Detroit 7. (218M).*

Box Design

Information on package evaluation and idea sources for users of corrugated packaging, outlining step-by-step procedure in package development from blueprint to finished box with illustrated 20 p. booklet.—*Public Relations Dept., Hinde & Dauch, Sandusky, Ohio. (218N).*

Closing Machines

Illustrations and description of line of suspended head bag closing machines. Bulletin 201. 4 p.—*Union Special Machine Co., 450 N. Franklin St., Chicago 10. (218O).*

Package Markers

Features of markers for conveyor line to date, code or mark production runs of cartons or packages. 8 p. bulletin.—*Industrial Marking Equipment Co., Inc., 454 Baltic St., Brooklyn 17. (218P).*

Counting Machines

Features and illustrated applications of models of counting machine. Catalog.—*F. B. Redington Co., 109 S. Sangamon St., Chicago. (218Q).*

Case Sealers

Details of unit to automatically seal cases and paper shipping containers, with illustrations. Form 100-37, 6 p.—*J. L. Ferguson Co., Joliet, Ill. (218R).*

Packaging Units

Information on single tier case

loader, multiple case loader, and case opener and positioner, with illustrations. Form 100-54A. 6 p.—*J. L. Ferguson Co., Joliet, Ill. (218S).*

Paper Bags

Information on line of paper bags available in sizes from 2 lb. to 100. Bulletin TP-54.—*Thomas Phillips Co., Akron, Ohio. (219A).*

Vacuum Labeling

Details on three units for vacuum label handling. Bulletin 72-5M-254-LD. 4 p.—*N. J. Machine Corp., 1580 Willow Ave., Hoboken, N. J. (219B).*

Carton Set-Up

Information on machines for tuck-end carton set-up. 4 p. bulletin.—*Machinery Mfg. Co., Inc., 2431 Dallas St., Los Angeles 31. (219C).*

Packaging Equipment

Information on packaging machines and how to select them for specific needs. Folder.—*Package Machinery Co., Springfield, Mass. (219D).*

Wrapping Machines

Models of high speed variety packagers, adaptable for wide range of packages, shapes, and sizes. Leaflet.—*Battle Creek Packaging Machines, Inc., Battle Creek, Mich. (219E).*

Carton Filling Machines

Illustrated description of automatic and semi-automatic carton filling and sealing machines. Brochure.—*Clybourn Machine Corp., 6483A No. Avondale Ave., Chicago 31. (219F).*

Meat Packaging Products

Illustrated presentation of line of packaging products especially developed for meat packing and poultry industry. Bulletin JTKM-4, with loose leaflets.—*Central States Paper & Bag Co., 5221 Natural Bridge, St. Louis 15. (219G).*

Straw Paperboard

Recently developed paper made from straw for use as fluted center portion of corrugated paperboard to combine lightweight and strength, with colorful illustrations. 8 p. brochure.—*Alton Box Board Co., Alton, Ill. (219H).*

INSTRUMENTS

Laboratory Instruments

Reference manual on instruments for spectophotometry, pH instrumentation, nephelometry, photofluorometry, flame photometry and automatic titration. Catalog.—*Coleman Instruments, Inc., 318 Madison St., Maywood, Ill. (219I).*

Regulating Viscometers

Description of operating principles and applications of types of recording and regulating viscometers. Bulletin 15-XII.51. 8 p.—*Drage Products, 406 32nd St., Box 330, Union City, N. J. (219J).*

Control Instruments

Information on miniature recorder and controller, with illustrations and specifications. Bulletin 7201-5M. 12 p.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44. (219K).*

Weighing Equipment

Description of use of load cells in conjunction with electronic instruments for tank, bin and hopper weighing. Data Sheet 10.18-7. 4 p.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44. (219L).*

Instrumentation Research

Suggestions on how to modernize indicating, recording and controlling instruments. Catalog 65M-G.71. 12 p.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44. (219M).*

Analysis Kits

Description of analysis kits for on-the-job determinations of carbon dioxide or oxygen in flue gases, furnace atmospheres and other gas mixtures. Bulletin 306.—*Burrell Corp., 2223 Fifth Ave., Pittsburgh 19. (219N).*

Level Control

Features of unit for utilizing inert capacitive-type sensing probe and electronic control circuits to operate a pneumatic pilot valve. Form CP 2-854.—*Thermo Instruments Co., 1310 County Rd., Belmont, Calif. (219O).*

Thermoswitch Unit

Description and specifications of liquid-filled snap-action thermoswitch unit. Form MC-120—*Fenwal Inc., Ashland, Mass. (219P).*

Temperature Control

Features, applications, and specifications of remote bulb temperature control. Form MC-121.—*Fenwal Inc., Ashland, Mass. (219Q).*

Recording Controls

Listing and illustrations of line of recording automatic controlling and telemetering instruments. Bulletin DMO35.—*Bristol Co., Waterbury 20, Conn. (219R).*

Rotameter Model

Operating features, sizes and dimensions of rotameter in which can be used 4 different sizes of tubes. Bulletin 18-RG.—*Schutte & Koerting Co., 2223 State Road, Cornwells Heights, Pa. (219S).*

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MAINTENANCE

Maintenance Coatings

Facts on long-wear resin coatings for heavy duty maintenance finishes. Brochure.—*Shell Chemical Corp., 380 Madison Ave., New York City 17. (220A).*

Floor Problems

Information on various types of floors, how built, and problems arising in their care, with photos, diagrams and drawings. Bulletin 23D, 25G. 24 p.—*Tremco Mfg. Co., 8701 Kinsman Rd., Cleveland. (220B).*

Maintenance Equipment

Information on line of steel shelving, cabinets, bins, trucks, stools and other storage and maintenance equipment. Catalog H-4. 16 p.—*Bernard Franklin Co., Inc., Bath & Hedley Sts., Philadelphia 37. (220C).*

Aluminum Tube Caps

Details of sterilized aluminum caps to be slipped over tops of culture tubes, replacing cotton plugs, with application photos. Brochure.—*Lowell S. Fisher Co., 31 E. 45th St., Indianapolis 5. (220D).*

Maintenance Program

Discussion of comprehensive program for planning and controlling plant maintenance. Bulletin DR-954-5. 28 pages—*Anderson-Nichols & Co., 150 Causeway St., Boston 14. (220E).*

INGREDIENTS

Seasoning Catalog

Comprehensive illustrated discussion of oleoresin flavoring products in two parts: One, general development and manufacture of "Spisoresin Seasonings" line, with flavor strength charts, formulation listings, etc.; Two, development, manufacture and application of seasoning products for direct use of meat packing and food processing fields, including 28-page tabulation of state and federal regulations for sausage and other meat products. 72 p. "file-folder" brochure.—*Dodge & Olcott, Inc., 180 Varick St., New York City 14. (220F).*

Research Chemicals

Information on research chemicals of animal origin, including several new products. Catalog 7. 6 p.—*Research Div., Armour & Co., Chicago 9. (220G).*

Citric Acid

Description of uses of citric acid and its esters as sequestering agents in edible fats and oils. Bulletin 72. —*Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6. (220H).*

MANAGEMENT

Baking Classes

1955 catalog of the Amer. Institute School of Baking, including classes in Baking Science and Technology (Jan. 31-June 17), Baking for Allied Personnel (Jan. 17-Jan. 28), Bakery Sanitation (Mar. 21-Mar. 24), and Bakery Equipment Maintenance (Sept. 12-Sept. 17).—*School of Baking 400 E. Ontario St., Chicago 11. (220I).*

Duplicating Paper

Information on chemically coated paper for making duplicate copies without carbon paper. Bulletin A-836. 4 p.—*A. A. Watts Co., Inc., 216 William St., New York City 38. (220J).*

Communication Systems

Illustrated information on planned plant communication systems. Bulletin 10M-5-53. 16 p. —*Tel Autograph Corp., 16 W. 61st St., New York City 23. (220K).*

Products, Facilities

Illustrated material on departmental operations of company and its 11 divisions; also products, services and their industrial applications, and list of available catalogs. 50 p. brochure.—*Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh 30. (220L).*

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SANITATION

Liquid Cleaner

Cleaning solution for removing grease, oil, fat and tar-like substances from any surface. Bulletin WC-1714. 4 p.—*Whistl-clean Corp., 404 Fourth Ave., New York City 16. (220M).*

Skin Fungi Preventive

Details on odorless solution of mineral salts for toughening skin to prevent athlete's foot. 4 p. bull. —*Onox, Inc., 121 Second St., San Francisco 5. (220N).*

Pot Washer

Motorized scrubber and polisher for heavy duty work designed for mounting on wall 6 p. folder.—*Barton Products, Inc., 819 N. Blanchard, Wheaton, Ill. (220O).*

7 Packaging Strides

—*Continued from page 86*

Through newly developed forming techniques, it is possible to handle polystyrene on a high-speed production basis, a development which should open new possibilities.

Its use as formed transparent tops for cardboard food containers, such as for confectionery-bakery products, etc.) will undoubtedly "catch on."

Polystyrene's clarity, dimensional stability, high heat-distortion point, and costs are inviting factors.

7—Better Label Adhesion to Glass

A label's "stickability" when adhered to a glass container depends on several conditions other than the properties of the adhesive. Among them:

1. Water absorptiveness or moisture porosity of labels.

In numerous cases it has been found that labels having very low water-absorptive properties (range of 15-25g. per square meter by the Cobb test) fail to adhere to glass as satisfactorily as the more absorbent labels, particularly in those instances where hygroscopic or crystalline adhesives are used.

The difference in adhesion properties were especially significant at test conditions of 90 deg. F. and 95% RH, and at 10 deg. F. and 10% RH.

2. Thickness of the adhesive film.

It is fairly well established that a film thickness of 0.001-0.002 in. produces a better label for glass adhesion than the heavier films. To assure good performance the liquid adhesive should be applied in just sufficient quantity for full surface contact.

Any increase in film thickness beyond that necessary for complete contact weakens the bond. Distortion in the contour of labeling panels also affects adhesion.

3. Bottle-surface contaminants.

These change the nature of the glass surface, thus effect film coverage as well as initial and final bonds.

End (*Resume reading on page 87*)

Insect Control

—*Continued from page 83*

To achieve this coverage in the specified time, air (or steam) pressure must be maintained at 80-100 psi. Atomizers will operate at lower pressures, but 60 psi. is the recommended minimum. Proper operating pressure not only insures that the required quantity of insecticide will be dispensed in the fogging time allowed, but also is necessary to produce jets in a velocity to blanket the area.

Power requirement per atomizer, when operation is on air pressure, is approximately 3 hp. at 80 psi. For steam at the same pressure, $3\frac{3}{8}$ boiler hp. is required, consuming about 125 lb. of steam per hour.

In operation, one air valve in each room controls a series of atomizers. Opening the valve starts them to fog simultaneously, and the area is completely vaporized in about 10 min.

When this equipment is employed according to directions of the maker (West Disinfecting Co., Long Island City, N. Y.), the insecticidal fog reportedly is neither toxic nor irritant to humans, and it is non-corrosive to metals or painted, varnished, or lacquered surfaces.

As for use in food plants, the maker states that tests conducted in a variety of establishments show that fogging does not contaminate foods when application directions are followed, and on this basis the system has USDA approval. While any traces of insecticide are removed from foods that are washed in the normal course of processing, it is recommended that exposed foodstuffs be covered while fogging.

Finally, no fire hazard is introduced by the atomizer system, since the fog mixture is well below the explosive limit.

End (*Resume reading on page 84*)

To the Employee Relations Director of every American company

LET'S FACE IT. . . the threat of war and the atom bomb has become a real part of our life—and will be with us for years. Fires, tornadoes and other disasters, too, may strike without warning.

The very lives of your employees are at stake. Yours is a grave responsibility. Consider what may happen.

When the emergency comes, everybody's going to need help at the same time. It may be hours before outside aid reaches you. The best chance of survival for your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. To be unprepared is to gamble with human lives. Disaster may happen TOMORROW. Insist that these simple precautions are taken TODAY:

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's entirely integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here again, your CD Director can help—with advice on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First Aid Training Courses.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good employee relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . before it's too late.

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350 Park Square Bldg....Hubbard 2-7160

CHICAGO 11.....J. G. Cashin
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CLEVELAND 15.....Thomas E. Taylor
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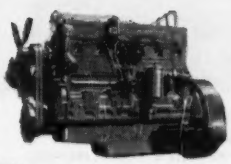

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PLUS four-wheel-drive models of 11,000 and 15,000 lbs. GVW—built for lowest cost operation in roughest, toughest terrain.

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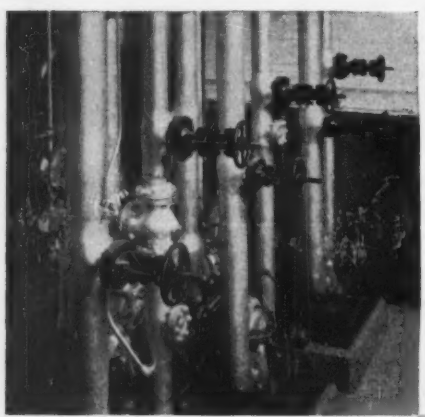

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4 All items shown
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4b Motors
4c Controls
4d V-Belts
26 All items shown
26a Can-body flanger
26b Can-scroll shear
26c Can-body maker
26d Gang slitter
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28 All items shown
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218b Fillers
219a Piston valves
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Position .....Product.....

Company .....

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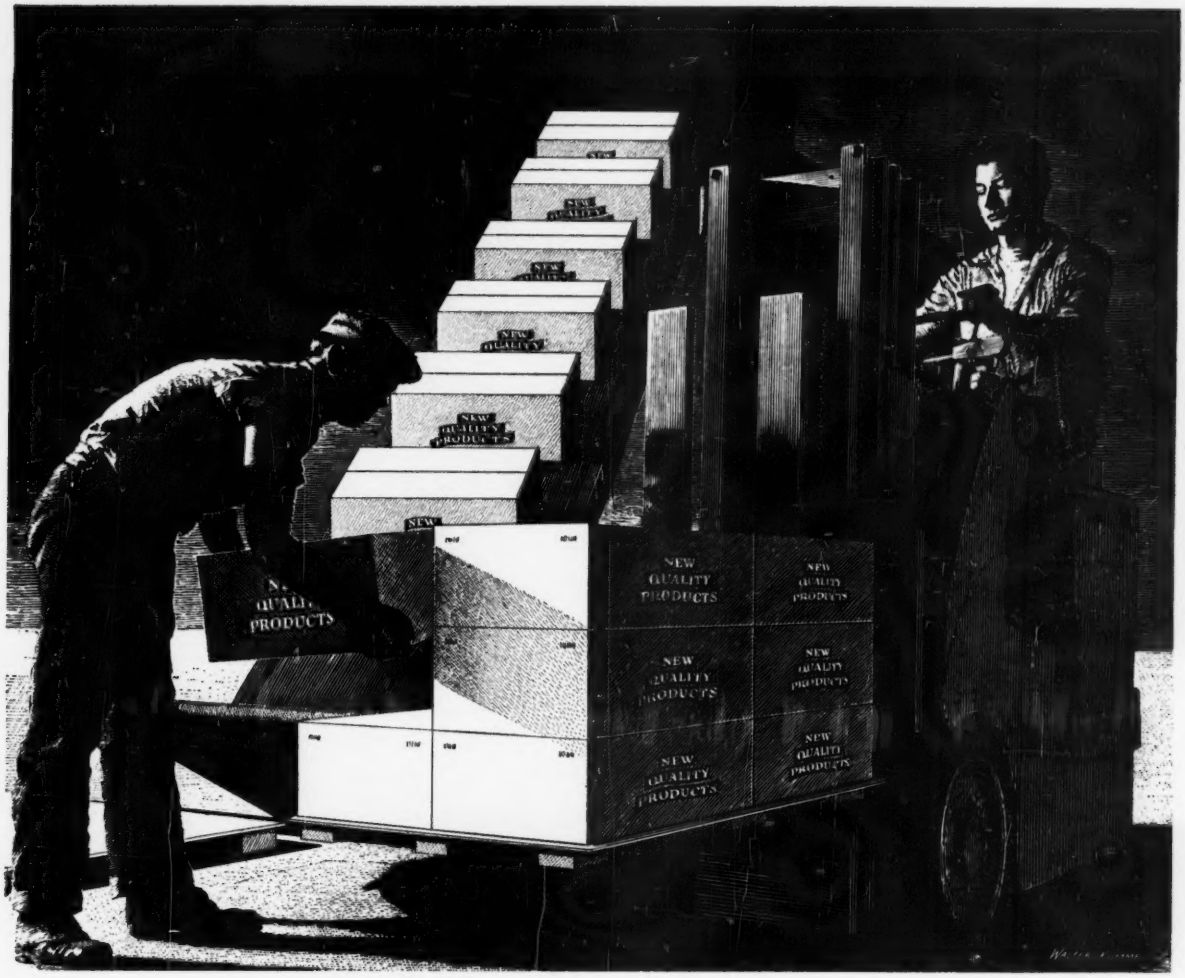

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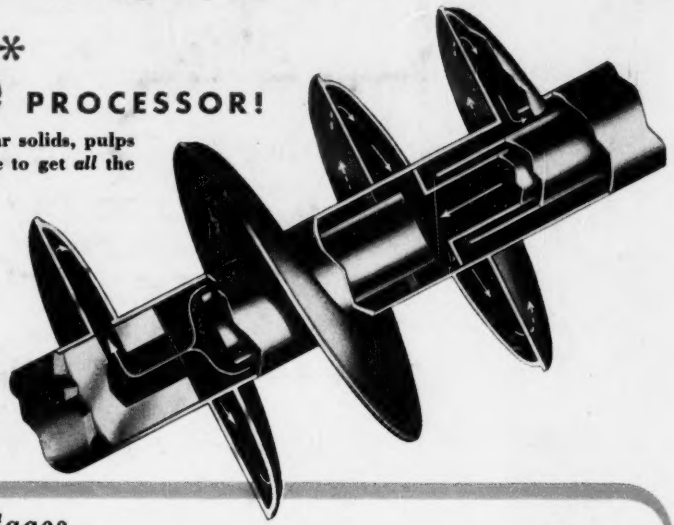
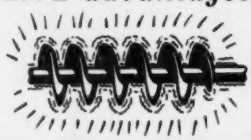


HOLO-FLITE handles such processes — *in continuous flow* — in as little as 1/5th the space of other types of heat exchangers. What's more, it is readily adaptable to a wide range of applications — is simple to install and maintain — and provides many other important savings.

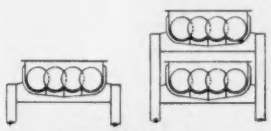
typical HOLO-FLITE *advantages . . .*

ITS APPLICATION FLEXIBILITY is almost unlimited. It cools, heats, or dries. It handles granular solids, pulps, pastes, slurries and fluids with equal ease. Its heat transfer agent can be water, refrigerant, hot oil, Dowtherm, steam or other liquids or vapors at any of a wide range of temperatures. It cools materials in ranges from 1800°F to 0°F. It heats and dries with hot oil to 600°F . . . with Dowtherm to 750°F . . . with steam to 150 lbs. per sq. in. pressure.



THE LARGE HEAT-TRANSFER SURFACE saves space — HOLO-FLITE requires as little as 1/5th the space of other heat-exchange equipment of comparable capacity. Moreover, a more complete heat transfer is effected, resulting in more uniform processing.

ROTATION IS SLOW — granular and powdered solids are handled with practically no dusting — negligible abrasion. There are no dust recovery problems — a further saving in installation, maintenance and operating costs!



ITS OPERATING CAPACITY is readily adaptable to virtually any requirements by simply varying the diameter, pitch, and length of flights, as well as the number of "tiers." Multi-tier units require no more floor space than single-tier installations!

HOW HOLO-FLITE WORKS . . .

Basically the HOLO-FLITE consists of one or more flights of hollow-bladed screw conveyors. The product to be processed moves through a trough housing the conveyor screws. The heat-transfer fluid circulates through the hollow blades and shafts of the conveyor. The product is constantly rotated into, around, under and over the blades and shafts through which the heat-transfer fluid is circulating, assuring quick, uniform heat passage between the two mediums — *as the product is continuously moved along in a bulk-flow without interruptions!*

GET THE COMPLETE FACTS on Holo-Flite savings and how this field-proven unit can save space, time and money on your processing operations. This eight-page descriptive bulletin will gladly be sent on request. No obligation, of course!

WESTERN Precipitation CORPORATION

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* T.M. Reg. (Hollow-Flite)